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Clarence Stephen Marsh, *Editor*

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The Educational Record

April 1939

European Influences upon American Higher Education

By W. H. COWLEY

THE University in the United States is *sui generis*. Although its models were European institutions of higher learning, its developments have been peculiarly its own. Thus, in the minds of even those Europeans who know the United States, higher education for Americans is a confused patchwork quilt devoid of both design and intelligibility. With this judgment many Americans agree, more particularly those who believe that the United States should establish clear-cut distinctions between the levels of education: elementary, secondary, and higher. These distinctions, however, are blurred, and for reasons which will be explored in this statement.

In the European sense America has no universities. Several hundred of the nearly seventeen hundred institutions of so-called higher education in the United States label themselves universities, but not one of them is a university in the original medieval sense or in the sense that most Europeans understand the university idea. This generalization includes Harvard, Columbia, Johns Hopkins, Chicago, and the other institutions which are in name and in fact great centers of learning. Abraham Flexner, one of the severest of critics of American higher education, describes American universities in these words:

> The term "university" is very loosely used in America; I shall not pause to characterize the absurdities covered by the name. . . . The great American universities are composed of three parts: they are secondary schools and colleges for boys and girls; graduate and professional schools for advanced students; "service" stations for the general public. The three parts are not distinct: the college is confused with the "service" station and overlaps the graduate school; the graduate school is partly a college, partly a vocational school, and partly an institution of university grade.[1]

Whether or not one agrees with Mr. Flexner's point of view, one must admit this to be a fair description of American higher education. The American university is, as has been observed, *sui generis*. Originally patterned after European institutions and periodically influenced strongly by European ideas, its development has been largely conditioned by changes in American society. Like other institutions American higher education has become what it is because of the impact of social forces. To understand its present status one must look to (1) European influences which have played upon it, (2) world movements which have affected the higher education of all nations, and (3) American social forces which have molded it to the peculiar American situation.[2]

In very general terms, major influences upon higher education in the United States have come from England, Scotland, France, and Germany. Each of these has had its predominant effect during a particular period in the history of the United States and its educational institutions. Subject to the normal limitations of a sweeping generalization the following statement may be made: the English and Scottish influences dominated the Colonial Period (1607-1776), the French imprint was sharpest in the late eighteenth and early nineteenth centuries, the German influence came in during the middle of the nineteenth century and continued dominant until the World

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[1] *Universities: American, English, German,* 1930, p. 45.

[2] This paper discusses only the first of these influences—the European. The material printed here is part of a chapter prepared by President Cowley for a book entitled *The University Outside of Europe,* to be published by the International Student Service, Geneva.—Editor.

War, and since 1918 a return to English practices has in some quarters become apparent.

The Colonial Period

Harvard, the first institution of higher learning within the boundaries of the present United States, began its remarkable history in 1636. About thirty-five of the members of the Massachusetts Bay Colony were graduates of Emmanuel College, Cambridge, and when they established a college in the vicinity of Boston they followed the Emmanuel pattern. Emmanuel had itself been founded but fifty-two years before as "a Puritan foundation established for the special purpose of providing the Church with a preaching ministry."[3] Under Puritan auspices Emmanuel had become by 1617 the largest Puritan college in the English universities. The Puritan movement and its collegiate stronghold, however, ran into difficulty under the early Stuarts, whose Arminianism impelled Puritans to seek new homes in the New World. In 1629 a group of Cambridge and East Anglican Puritans came to the conclusion that "the time had come to establish a new England overseas; and New England must include a new Emmanuel."[4]

Against this background Harvard was founded six years after the "Arbella" landed with nine hundred passengers upon the shores of Massachusetts Bay. The colonists had left England chiefly to seek, as the "Mayflower" pilgrims had sought in 1620, religious freedom. Other Englishmen, little interested in religious disputes, had migrated to Barbados and Virginia to seek their fortunes in the New World, but the New England colonists were impelled to seek new homes chiefly for religious reasons. For the same religious reasons —broadly conceived, however—they founded Harvard.

This brief review of the impulse behind the establishment of the first American college is important because it illuminates the beginnings of one of the major considerations in an understanding of American higher education. With few ex-

[3] Samuel E. Morison, *Founding of Harvard College*, 1935, p. 92.
[4] *Ibid.*, p. 107.

ceptions American colleges and universities have been established under religious auspices. Today, however, the predominant spirit of all levels of education is secular. To comprehend the development of American higher education, however, one must understand these early religious motivations. Harvard opened its doors as a Puritan college. Eight other colleges followed her during the Colonial Period: William and Mary (1693) an Anglican college; Yale (1701) a Congregationalist college established primarily as a protest against the religious liberalism creeping into Harvard; Princeton (1746) New Lights Presbyterian; Columbia (1754) essentially Anglican; Brown (1765) Baptist; Rutgers (1766) Dutch Reformed; and Dartmouth (1769) New Lights Congregationalist. Only the University of Pennsylvania, established in 1755, began as a secular institution, but it soon came under the control of the Presbyterians and shifted its religious allegiances until finally it abandoned religious ties entirely.

English influences dominated the Colonial colleges giving them the following characteristics: first, control stood in the hands of religious groups rather than in the state or with the public; second, the English curriculum, transplanted to America and but slightly modified as occasion demanded, became the standard curriculum of American higher education until the middle of the nineteenth century; third, all early American colleges followed the residential pattern of the English universities and highly valued what Cotton Mather called "the collegiate way of living," giving emphasis thereby to the philosophy that education involves the whole man rather than his intellectual training alone; fourth, the early colleges accepted from England without question the assumption that higher education is for the aristocracy—the aristocracy of brains if not of purse—and thus restricted the clientele of American higher education until the rise of democratic sentiment in the nineteenth century; fifth, all nine of the Colonial colleges, and all that followed until the Civil War, opened as colleges rather than as universities and remained colleges until the last decades of the nineteenth century, putting their emphasis

upon teaching rather than upon the advancement of learning.

English patterns did not, however, monopolize the Colonial colleges. Scottish influences played upon both William and Mary and the University of Pennsylvania. More closely associated with continental institutions than with Oxford and Cambridge, Scottish universities were nonresidential, democratic, of slender resources, and in part governed by representatives of the community—a *modus operandi* which helped to prepare the way for boards of trustees. The Scottish universities were not private corporations but national institutions. In the prolonged attempts to found an institution of higher learning in Virginia during the seventeenth century the type and organization of the Scottish university provided an important model. These attempts eventuated in the founding of the College of William and Mary in 1693 under the presidency of James Blair who had been educated at the University of Edinburgh. Meanwhile, other influences came into William and Mary from Aberdeen which were even more important than those from Edinburgh. Thus

> by the end of the seventeenth century the cornerstone of an American system of higher education based, perhaps unwittingly, upon the Aberdeen model had been laid securely in Virginia. The inclusion of a preparatory department as an integral part of the college was one of its characteristics. A board of lay trustees was another. Last and most far-reaching in its effects has been the development of degree-granting colleges on the one hand and nonresident universities on the other, in both of which the old collegiate way of life (collegialiter) has all but disappeared.[8]

In time the Aberdeen pattern came into America directly from Germany (whence Aberdeen had more than likely adopted it) and came to dominate American higher education. Influences from Edinburgh were perhaps even stronger.

Like most of the state universities (in the United States) it evolved from an arts faculty under state patronage and without any attempts at a residential-college system. It was the resort of the American

[8] A. B. Cutts, "The Educational Influence of Aberdeen in Seventeenth Century Virginia," *William and Mary College Quarterly*, XV (1935), 229-49.

students who went abroad to study up until the time of the American Revolution.[6]

Another Scottish influence during the Colonial Period affected not organization but ideals. Several heads of Colonial colleges and teachers therein received at least a part of their education in Scottish universities.[7] William Smith, a Scotsman and a graduate of Aberdeen, became the first provost of the College of Philadelphia, now the University of Pennsylvania. Of the same institution Francis Alison, educated at Glasgow, became the first vice-provost.[8] Owing to its Presbyterian origin, the College of New Jersey, now Princeton University, elected in 1768 John Witherspoon, a Scotsman from Edinburgh, as president. Witherspoon served until 1794, was one of the signers of the Declaration of Independence, and did much to extend and liberalize the curriculum of his institution.[9] Herein lies Witherspoon's great importance in the history of American higher education: he introduced the study of natural realism and rooted out Berkeleyanism from Princeton. He imported natural realism from Scotland and so successfully controverted the idealism of Berkeley and the skepticism of Hume that his point of view continued a predominating force in American thought for over a century. It spread with the Presbyterian Scotch-Irish as they moved west over the Alleghenies, and because of their cultural importance their point of view formed a wedge between Puritan New England and the Anglican South.[10] The Scotch-Irish during the early nineteenth century organized many colleges throughout the Middle West and became an important influence in the development of American higher education.

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[6] G. E. Maclean, *Studies in Higher Education in England and Scotland,* U. S. Bureau of Education Bulletin, 1917, No. 16, pp. 49-50, 63.

[7] For a long list of Scotsmen who have played a prominent part in American education, see G. F. Black, *Scotland's Mark on America,* 1921, pp. 76-80.

[8] *Dictionary of American Biography,* (1928-1937) *sub* William Smith, and (1727-1803) *sub* Francis Alison.

[9] *Ibid., sub* John Witherspoon.

[10] W. Riley, *American Thought from Puritanism to Pragmatism,* 1915, pp. 118-35.

Princeton has perhaps more than any other college been "the mother of colleges." [11]

Despite the importance of the seedlings which the Scotch planted during the Colonial Period, English influences dominated. The collegiate way of living was everywhere standard practice. The British curriculum continued in control. The aristocratic point of view determined student clienteles. Teaching, rather than research, remained the dominant ideal. Finally, the church rather than the state kept the upper hand.

Post-Colonial Period until 1850

After the Revolution, particularly after the beginning of the nineteenth century, hundreds of colleges were established throughout the original thirteen states and especially in the Middle West. Alarmed by the rise of deism and spurred on by its eventual fall, religious leaders set out to save the nation from the corruption of free-thinkers. Thus Christian colleges were established by the hundreds, and although some 450 established between 1820 and 1860 have since died, the importance of religious motivations in the founding of colleges was thus demonstrated. Typical of this educational evangelism was the establishment of Illinois College by a group of religious zealots from Yale who called themselves the Yale Band. In this same state Knox College came into existence, organized by a group of religious men from Hamilton College.

Meanwhile new educational influences began to be exerted upon the United States from France.[12] Huguenot refugees,

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[11] D. G. Tewkesbury, *The Founding of American Colleges and Universities before the Civil War*, 1932, p. 92.

[12] The following discussion of French influences owes much to: H. M. Jones, *America and French Culture*, 1927. Other good discussions of some of the phases of it can be found in H. B. Adams, *Thomas Jefferson and the University of Virginia*, 1898; Sidney Sherwood, *The University of the State of New York*, 1900; R. J. Honeywell, *The Educational Work of Thomas Jefferson*, 1931; and B. A. Hinsdale, "Notes on the History of Foreign Influence upon Education in the United States," *Report of the Commissioner of Education for the Year 1897-98*, Vol. I, pp. 591 ff.

seeking religious liberty in the middle colonies, had been a leaven for French culture along the Atlantic seaboard, while French traders and missionaries, penetrating the Ohio and Mississippi valleys, had left a marked French stamp on the Middle West. The political *entente* between France and America in 1778 contributed strongly towards the accentuation of French culture in America. Things French became *comme il faut*. Instruction in the French language became the style in American colleges, Columbia establishing a chair of French in 1779, Harvard giving it a fairly permanent place in its curriculum in 1780, William and Mary in 1793, and Union in 1806. During this same period academies similar to the French Academy were established. In 1780 the American Academy of Arts and Sciences was founded in Boston, partly under the inspiration of John Adams, then American envoy in Paris. Its founders placed on record the statement that it was their intention "to give it the air of France rather than that of England, and to follow the Royal Academy rather than the Royal Society." Thus in Boston the Academy published "Memoirs" while British-dominated Philadelphia continued to issue "Philosophical Transactions." During these same years Quesnay du Beaurepaire, grandson of the famous physiocrat and a French officer in America during the American Revolution, inspired the Academy of Sciences and Fine Arts in Richmond.

Similarly, the French educational philosophy, which had been nurtured by the eighteenth century Enlightenment, affected the plans for the establishment of American universities. Under this influence the University of the State of New York was organized in 1784 as a nonteaching and nondegree-granting institution to supervise the state-wide system of education in all its branches. Likewise, when Michigan, long within the orbit of French missionaries and traders, projected its state university in 1817, French influences dominated. Furthermore, when Thomas Jefferson conceived the University of Virginia, his educational theories of a state institution

independent of the church were, in large measure, of French inspiration.

Because of the French Revolution the political friendship between the United States and France waned, but American interest in French culture was to a degree maintained partly by the influx of aristocratic and priestly émigrés. During the Napoleonic period American contacts with Frenchmen and with French culture were relatively slight, but after 1815 Bonapartist exiles and a thin stream of French immigrants, especially after 1830, combined with French influences in Louisiana and in portions of the Middle West to make cosmopolitan and middle-class groups conscious of French culture.

French influences upon American higher education might have continued to grow in importance except for three circumstances: first, the Catholicism of the French; second, the opposition to French liberalism which gripped New England; and third, the rise of the influence of German universities. The New Englanders came to hate France because of the political and religious liberalism which the French Revolution let loose. Strongly Federalist, New England rapidly cast off all traces of French cultural penetration, and stirred by the newly published praises of Germany, they turned from the Seine to the Rhine. Since America offered no opportunities for study beyond the undergraduate college, ambitious Americans set out for European universities. Except for those interested in the arts the number choosing France steadily decreased while the number going to Germany grew with great rapidity. The New Englanders in general avoided France for political reasons, and students from the politically more liberal sections of the country likewise eschewed it since French higher education centered in Paris, and Paris had the reputation of being a wicked city. Parents, predominantly puritan in their ethical outlooks, feared to trust their sons to its blandishments.

Added to these prejudices were a number of pointed academic considerations. While the Germans were building

their revived culture upon science, French academicians joined with the English in neglecting scientific instruction. Pasteur, Bernard, and others attained international eminence during the middle of the nineteenth century because of their brilliant scientific work; but, neglected until late in life by the intelligentsia and the academic bureaucrats, they toiled away in poorly equipped and undersupported laboratories which made practically no provisions for graduate students. Thus Americans, stirred to their depths by the scientific urge and thrilled by the progress of German universities, flocked to Germany. Except for those interested in the fine arts, few Americans studied in France after the middle of the century. Almost unknown to Americans in 1815, Germany—because of the devotion of its universities to the scientific methods—succeeded in reducing French influences upon American higher education to relative unimportance.

1850 to the World War

Early during the century Americans had begun to look to Germany rather than to England and France for educational leadership. During the second decade of the century Ticknor from Dartmouth, and Everett, Cogswell, and Bancroft from Harvard had discovered Göttingen and then Berlin. Returning home after several years of enthusiastic discipleship at the shrine of German learning they opened up a highway to German universities over which two hundred other American students had traveled by 1850. By 1914 some ten thousand Americans had followed these pioneers, the great majority of them returning to professorships in American colleges. Enamored of German scholarship and of German educational methods, they sought to reorganize American higher education after the German pattern. So important have been German influences upon American higher education that the rise of German universities to world eminence must be briefly reviewed here.

After the battle of Jena, Prussia sank to the status of a third-rate power and the treaty of peace signed at Tilsit in

1807 drove the leaders of the nation to a desperate effort to revive the self-respect and energies of their people. In this great crisis the philosopher Fichte took to the lecture platform with a series of fourteen *Addresses to the German Nation.* He declared:

> If Germany is to be saved, the nation must be taken as the unit of social organization. Germany must realize its character and destiny, and through a conscious control of education, it must liberate all its potentialities—moral, intellectual, physical, vocational—for national service.[13]

So cogent were Fichte's arguments and so pervasive his prestige that the Prussian people as a unit reached out to education as their means of regeneration.

The legislation which followed Fichte's ardent appeal established a national system of education which included not only the reorganization of the common schools, but also the development of scholarship and research in the universities. "The state," Frederick William III declared, "must replace by intellectual forces the physical forces which it has lost." [14] Napoleon had devastated the country, closed most of its universities, annexed others, and generally destroyed the national morale; but greatly stirred by the Prussian King's pronouncement and by the unanimous agreement of their leaders, the people set to work through the medium of education to regain what they had lost. In 1809 the University of Berlin arose from the ashes of defeat and despair, the symbol of a nation which, though beaten in the field, would not be downed spiritually. At the same time Göttingen, Leipzig, Bonn, Giessen, and other German universities took on new life and, developing an intense nationalism, they sought and soon achieved world hegemony in all branches of learning, science prominently included.

Even before this rebirth the Teutonic universities had be-

[13] Abstract of Johann Gottlieb Fitche's *Addresses* by Edward H. Reisner, in *Evolution of the Common School,* 1935, pp. 218-19.

[14] Charles A. and Mary Beard, *The Rise of American Civilization,* Vol. I, 1927, p. 809.

gun to pull away from the traditionalism of their sister institutions in France, England, and Italy. During the early seventeenth century the Dutch universities of Leyden and Franeker had made an almost clean break with the past; and long before Napoleon had made the University of Halle a part of his puppet state of Westphalia, Christian Wolff, its leading professor, had repudiated Aristotelianism and the dependence of philosophy upon theology.[15] In France and England these shackles had already been thrown off, but the emancipators were independent thinkers, such as Descartes, Locke, and Hume, who were not connected with universities. In these countries the academicians continued to concentrate upon theological and verbalistic studies, but because of Wolff and his associates Francke and Hecker, German scholars were able to free themselves and their institutions from the heavy hands of the medievalists and the theologians, the professors of other European nations delaying the break for another century.

This circumstance gave German universities a striking advantage not only in philosophy but also in philology and the physical sciences. Wolff built his thinking upon the premise that philosophy should seek the truth free from all theological assumptions. He had been profoundly impressed not only by writings of the rationalists of other nations, but he also recognized the evolving disciplines of mathematics and physics as the natural allies of his system of thought. Similarly he saw in philology a scientific tool for ferreting out the contradictions and discrepancies in the philosophical and religious writings of the ancients. When he died in 1754 his philosophy had come to dominate both the universities throughout central Europe and the Prussian court; and the humanistic and physical sciences which he encouraged were well on their way to academic respectability and prominence.

Kant carried on in philosophy where Wolff left off, and bringing rationalism to bear upon ethics, his teachings pene-

[15] Friedrich Paulsen, *The German Universities and University Study*, 1906. p. 45.

trated all the leading universities of Europe including those controlled by the Roman Church. The universal homage that came to him not only reflected upon the University of Königsberg where he taught for forty-two years, but it also brought recognition to Germany as an intellectually powerful nation. Kant died in 1804, but his leadership had much to do with preparing the way for the national awakening during the next decade. Similarly the mighty achievements of Lessing, Herder, Schiller, and Goethe in literature and the revolutionizing accomplishments of Mozart, Gluck, Haydn, and Beethoven in music produced an overwhelming conviction of greatness among the Germanic peoples. German philosophers were surpassing Englishmen and Frenchmen; German poets and dramatists were exhibiting a genius rivalled only by Shakespeare; German and Austrian musicians were completely dominating eighteenth century music; and German universities were striding ahead rapidly in science and literary scholarship while those of the rest of Europe dozed in the decaying past.

Against this background the University of Berlin opened its doors in 1810. A national catastrophe brought it into existence, but the way had been prepared for it by a hundred years of intellectual dredging at Halle, Königsberg, and their sister universities and by the epoch-making achievements of Germans in the arts. Emotionally of incalculable value as a national monument of renascence, Berlin sent its torrents of new energy into channels which had already been deeply cut. The founders, although chiefly philosophers and philologists, continued in the Wolffian-Kantian current; and chairs in physics, chemistry, geology, and other sciences were early established to match those in existence or planned for in the reanimated universities which the French had not succeeded in destroying. Further to promote the unity of the nation and to stimulate its progress, the Berlin founders also took over the Academy, making it an organic part of the University. In this fashion they concentrated the scientific leader-

ship of Germany in the universities rather than in independent societies as in England and France.[16]

The completeness of her adoption of the scientific method and the thoroughness of her professors established Germany in but a few decades as the leading nation of the world in all avenues of thought: science in all its branches, philosophy, humanistic scholarship. Soon enthusiastic visitors began to proclaim her greatness. Mme. de Staël and Victor Cousin wrote books for the French, and Coleridge and Carlyle triumphantly "marked an epoch in the history of English opinion" [17] when they introduced German literature and German transcendentalism to England. Americans, attracted by English and French fervor, came to marvel, to study, and to write home about what they experienced. Before the middle of the century a score of books on Germany and a dozen on German education had been published in America written by Griscom, Bache, Stowe, Mann, and others. Nor was the chorus of exhilarated approval short-lived. Matthew Arnold, visiting Prussia in the 1860's, discovered that "the idea of science governed every department of human activity." [18] A Frenchman, Ferdinand Lot, in 1892, wrote that "the intellectual supremacy of Germany, in all fields, without exception, is at present recognized by all nations." [19] Bryce about the same time extolled "the glorious eminence" of German science,[20] and Huxley lauded the German universities as "the most intensely cultivated and the most productive intellectual corporations the world has ever seen." [21]

In response to these acclamations aspiring young scholars and scientists flocked to the German universities from all the civilized nations of the globe. Meanwhile Oxford and Cambridge and the French institutions plodded along the classical road oblivious to the grass which had come to grow lustily

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[16] Paulsen, *op. cit.*, pp. 4, 167-78.
[17] Hinsdale, *Report of U. S. Commissioner of Education*, 1897-98, p. 598.
[18] *Friendship's Garland*, 1903, p. 10.
[19] Paulsen, *op. cit.*, pp. 168-69.
[20] *The American Commonwealth*, 1913, II, p. 741.
[21] *Science and Education*, 1896, pp. 104-7.

down its middle. In a bitter tirade against British backwardness Huxley wrote:

> The foreigner who should wish to become acquainted with the scientific or the literary activity of modern England, would simply lose his time and his pains if he visited our universities with that object.
>
> And, as for works of profound research on any subject, and, above all, in that classical lore for which the universities profess to sacrifice almost everything else, why, a third-rate, poverty-stricken German university turns out more produce of that kind in one year, than our vast and wealthy foundations elaborate in ten.[22]

The classical curriculum alone did not account for this situation in England. No less important was the fact that the established church controlled the two ancient seats of learning, and no one could be a candidate for a degree unless he were an Anglican, a requirement which remained in effect until 1871. Nor did Oxford and Cambridge make any provision for advanced studies. They continued to offer general education only, and quite naturally American students preferred Germany where they could prepare to become teachers in American colleges. Moreover, German universities held out the degree of doctor of philosophy as a tangible evidence of preparation for teaching. In England the doctorate for teaching and research became established only in the twentieth century, and to this day it is not popular.

The French, as well as the British, had strong ties with America; but—as already observed—through these, too, the German universities were able to break. Unwelcome in England, afraid of France, and intensely stimulated by the vigorous German universities, American students eagerly headed for Germany. Remaining long enough to be indoctrinated by German culture and German educational thought, these young Americans with hardly an exception became passionate devotees of German scholarship, unrestrained enthusiasts for German educational methods, and as one of them expressed it, "the intellectual subjects of Germany." [23] Thus teutonized by

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[22] *Ibid.*

[23] Charles S. Minot, *Science*, Dec. 6, 1912, pp. 771-76.

German universities, the best brains of American academic life initiated one of the most powerful movements that American education has experienced: the effort to improve the American college and particularly to adapt it to the purposes of scholarship and research. Ticknor and Bancroft began the campaign in the 1820's. In their immediate objectives they failed almost completely, but by the middle of the century their hopes and activities were being carried forward by an ever growing number of enthusiasts who, by 1900, virtually remade American higher education after models suggested by their German experience.

The American educational leaders who set about to transform American higher education and to establish universities comparable to those of Germany followed two courses of action: (1) the majority of them attempted to adapt the college, built on British foundations, to the German model; (2) a small number of leaders attempted to establish independent universities unhampered by historical backgrounds. The chief leader of the first of these two movements was Charles W. Eliot of Harvard. The leaders of the second were Henry Tappan of Michigan, Daniel Gilman of Yale, California and Johns Hopkins, and G. Stanley Hall of Clark University. Both movements have made their important contributions to the present status of American higher education but the first, because of American predilections, became the more important of the two. This will become apparent in the following review of both.

Charles W. Eliot, a professor of chemistry at the Massachusetts Institute of Technology, a former member of the faculty of Harvard, and a graduate thereof, became president of Harvard at the age of thirty-five in 1869. Aware of the powerful pressures playing upon American life and American education, he had spent two years during his early thirties studying European education. He concluded that Germany provided the best models for the organization of an institution dedicated to scholarship and the extension of knowledge.

Thus he sought to remake Harvard from a small, British-initiated college into a university.

Toward this end he took three important steps: first, he set about strengthening and adding to the professional schools which were geographically associated with Harvard but whose administrative ties were weak; second, he put new life into the elective system of studies which Ticknor had brought back from Germany and had unsuccessfully attempted to establish at Harvard in 1825; third, he established a graduate school as a superstructure upon the undergraduate college. Predecessors of Eliot at Harvard and also at Yale had attempted all three of these steps, but none had been especially successful and none had succeeded with all three efforts simultaneously. Eliot, however, a man of tremendous energy and determination, succeeded spectacularly in all three directions. When he took office in 1869 Harvard had but 1,050 students in all departments and a faculty of 59. When he laid down his office in 1909 his institution had become one of the world's great universities, its students numbered 3,882, and its faculty members had increased more than tenfold.[24] He killed and buried the limited arts college curriculum which he had inherited. He built up the professional schools and made them an integral part of the university. Finally, he promoted graduate education and thus established a model which practically all other American universities with graduate ambitions have followed.

Meanwhile, other leaders were traveling down the second road, i.e., the road leading to the establishment of universities independent of undergraduate colleges. Henry Tappan became president of the University of Michigan in 1852 and for nine years he did his best to reorganize it after the German model. His Prussian ideas were, however, too far advanced for a pioneer culture, and in despair he left the country never to return. Gilman, however, succeeded where Tappan failed. In 1876 he established the Johns Hopkins

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[24] Henry James, *Charles W. Eliot*, 1930, Vol. II, p. 347.

University with funds provided by Johns Hopkins who had made a fortune in the development of the Baltimore and Ohio Railroad. Gilman's interest was entirely in graduate instruction. He believed that America needed a great university of the sort which had been so successful in Germany. Announcing at the outset that he would put no money into buildings but would cencentrate his funds upon men who were outstanding scholars, he built up a world-famous faculty. At the same time, under the will of Johns Hopkins, he organized a combined medical school and hospital which have continued through the decades to be one of the most outstanding medical establishments in the United States.

Great as has been the contribution of Johns Hopkins to American higher education, it has nevertheless not been able to stand up as a university independent of undergraduate instruction. Thus, reluctantly, but of financial necessity, Hopkins soon organized an undergraduate department. The American people were not and, apparently, are not convinced of the need of universities which devote all of their energies to advanced higher education. After Hopkins came Clark University (1888) which has had much the same experience. These two great institutions, which in the nineties were considered to be of such great significance in American higher education, have lost their leadership to Harvard, Chicago, the University of California, the University of Wisconsin, and other such institutions which have followed the Harvard plan of organization, to wit, a graduate school superimposed upon the undergraduate college.

American institutions of higher education have been tremendously influenced by the organizational methods of German universities, but quite as important has been the example of German science. The Germans applied the scientific method to every conceivable kind of knowledge—the arts prominently included—and fascinated American students brought back their point of view to America and especially to American colleges. The classicists had fought the inclusion of science in the curricula of American colleges, but

when the German wave grew to its full heights even the classicist began to apply scientific techniques to literature. Thus the humanistic emphasis in education dwindled to a faint voice in American education, and science came to dominate educational philosophy.

German examples had a third and equally profound effect upon American higher education: the undermining of the "collegiate way of living" and the close personal relations between students and professors which had characterized all colleges until the influx of German ideology. In the attempts to make over Harvard, Columbia, Yale, and other leading institutions from colleges to universities, faculties left their students to their own devices. This impersonalistic point of view spread to colleges large and small. Faculty members no longer had time to be interested in their students. They sought the newly-prized label of the professoriate, the doctorate of philosophy; and when they had acquired that, they devoted their time and their energies to research rather than to their students. Their increases in salary and their elevations in rank were, they came soon to learn, to be determined by the number of their scientific and scholarly publications, and quite naturally they followed the demands of their administrative superiors. Fifty-five years ago (1884) the Harvard faculty consisted of 189 members, only 19 of whom had their Ph.D.'s. During the same year the Michigan faculty was made up of 88 members, only six of whom had Ph.D.'s. These few doctors of philosophy, however, formed a vanguard of a great army of college teachers who rapidly became entangled in what William James called the Ph.D. octopus; and as they became entangled, by the very nature of their entanglement, they were forced to devote their energies to scholarship and research and to neglect the personal relationships with students which had, until that time, been one of the most cherished characteristics of American higher education.

German and continental philosophies of education were chiefly responsible for this revolutionary change, and American educational leaders, trained in Germany or devoted to

German ideals, led the onslaught upon the old order. Francis Wayland [25] began the attack at Brown in 1842; Tappan [26] followed him at Michigan ten years later; Barnard [27] joined them at Mississippi, Alabama, and Columbia; White [28] at Cornell added the force of his tremendous prestige to the new point of view; and Eliot, fresh from his study of European education, read in his inaugural address [29] at Harvard in 1869 the death sentence of the old order.[30] Students were to be considered adult men who needed no personal interest from their instructors. The paternalism of the past thus gave way to almost complete indifference.

This mood spread through all avenues of student life. The old and deeply ingrained interest in the housing of students vanished. Commons for the serving of food frequently disappeared. The disciplinary rule books grew thinner and thinner. Interest in student religion waned. The elective system permitted a student to study what he pleased with no one to gainsay him if he chose nothing but elementary courses throughout all his four years. Finally, in 1886,[31] Harvard adopted the continental philosophy of student life in toto by announcing that attendance at classes would no longer be taken for juniors and seniors and that they would be required to pass only course examinations. What the student did with his time between registration at the beginning of the year and final examinations at the end, no one cared. Impersonalization had set in with a vengeance.

In the judgment of many American educators, the rise of athleticism and the strong grip which so-called extracurricu-

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[25] Francis Wayland, *Thoughts on the Present Collegiate System*, 1842.

[26] Andrew C. McLaughlin, *History of Higher Education in Michigan*, U. S. Bureau of Education Circular of Information, No. 4, 1891, p. 52.

[27] F. A. P. Barnard, "Analysis of Some Statistics of Collegiate Education" a paper read before the Trustees of Columbia College, Jan. 3, 1870, pp. 28-29.

[28] *Autobiography of Andrew Dickson White*, 1905, I, p. 349.

[29] Charles W. Eliot, "Inaugural Address as President of Harvard College," *Educational Reform*, 1898, p. 18.

[30] Charles W. Eliot, "Liberty in Education" (Address before the Nineteenth Century Club of New York in 1885), *Educational Reform*, pp. 129, 146-47.

[31] This plan failed and was soon abandoned.

lar activities have upon American college students may be ascribed to this German-born impersonalism. The statement is frankly controversial, but it is significant to observe that intercollegiate athletic contests and huge extracurricular undertakings in dramatics, student publications, and other such enterprises began to grow to their present large stature at the time that impersonalism came to control the thinking of college faculties. With some justice the statement is made that students, finding faculty members engrossed in research, and being little interested in research enterprises themselves, set up their own student life giving play to their own systems of values. That there is much truth in this generalization, most Americans will agree, although it must also be borne in mind that the coming of democracy brought many students into the colleges who were not interested in learning *per se* and also that the individualistic and competitive nature of American society has stimulated student undertakings which give students training while in college (under their own auspices) for the traits of character which are considered so important in American industrial, business, and even professional life.

Whatever justice there may be in laying the strength and importance of athleticism and other extracurricular activities at the door of German educational examples, it must be admitted that German universities tremendously influenced American higher education in this direction as well as in the two others already discussed: the reorganization of the structure of higher education and the adoption of the scientific method. These three pressures from Germany completely transformed the American college, and Germany rather than England became the chief source of inspiration for American educators.

Since the World War

German leadership continued until the World War and indeed predominates in many particulars to this day. English points of view, however, returned to favor after the war in at

least three directions: first, the housing of students; second, methods of instruction; and third, the objectives of education. Each of these deserves at least brief discussion.

The proponents of German impersonalism directed much of their criticism to the housing system which America had taken and adapted to its purposes from English universities. These attacks upon dormitories continued without abatement until the 1890's when a reaction set in. Yale, Chicago, and Princeton led this reaction, and during recent years both Harvard and Yale have given it great impetus. Yale had always been convinced of the validity of the housing program, and while Eliot was doing his best to kill it at Harvard, the Yale presidents whose careers paralleled his, fought for its continuance. From Yale the dormitory idea spread to the Middle West where it had made practically no headway theretofore. William Rainey Harper, a Yale professor of Hebrew, had organized and become president of the University of Chicago in 1893, and he took with him an enthusiasm for dormitories. He built four in the first group of university buildings, devoting 57.3 per cent of the total building cubature to them. By 1900 he had erected seven "in spite of the prejudice against them at the time in the West on the ground that they were medieval, British, and autocratic." [32] The leadership of Chicago, so potent in all other matters of higher education, had its important influence in arousing other middle western institutions to an interest in housing.

Meanwhile important developments were taking place at Princeton. Early during the twentieth century Princeton erected a graduate school built upon the philosophy that "the enriching advantages of mutual incentives and community of intellectual interests" can be made possible only by "an identity in mode of living" and by "residential intimacies." Woodrow Wilson, following the leadership of Dean Andrew F. West of the Graduate School, proposed in 1907 that Princeton go even further and adopt the English system of housing students and unmarried members of the faculty in the same buildings.

[32] F. W. Reeves, E. C. Miller and J. D. Russell, *Trends in University Growth*, 1933, p. 158.

He sought to make the housing units of Princeton educational agencies as well as body shelters. In this effort Wilson failed, but Harvard and Yale, financed with many millions of dollars given by the philanthropist Edward Harkness, reorganized after the English housing model in the late twenties. The Harvard units are called "houses," the Yale units, "colleges." In both institutions members of the three upper classes reside in these buildings, each of which includes approximately 250 students. Each house or college is under the direction of a resident master who lives within the structure (often consisting of several structures) with his family. Each house or college has its dining room, its common rooms, its library, and studies for members of the faculty of the university who have been elected fellows.

These new housing units have completely revolutionized the life of both Harvard and Yale. They have brought back some of the important educational values that the German point of view considered so insignificant: the camaraderie of the dining room, close association between students and faculty members, small student groups to replace mass organization, and, most important of all, the identification of housing with the educational program.

Unfortunately no other American colleges and universities are sufficiently well off financially to follow the lead of Harvard and Yale in their housing programs, but even before the initiation of their houses and colleges, housing had again come to the fore as a highly-valued educational enterprise. In 1896 Columbia turned its back upon the German philosophy so strongly supported by former President Barnard and built its first dormitory. Cornell, two years later, followed by building a small cottage for women students, and in 1914 it erected its first dormitory. The state universities also fell into line, Minnesota building its first dormitory in 1897, Illinois in 1916, and even Michigan capitulating with two in 1915. Hundreds of other colleges and universities have followed these eastern and middle western leaders. The movement has been considerably hampered by the depression (except in state universities where dormitories are being built in part with federal

money), but it has remained actively alive. Nowhere, outside of Harvard and Yale, are dormitories an integral part of the instructional program, but despite this fact, English influence has at this point completely superseded the German.

English influences upon methods of instructions have also been prominent since the World War. Indeed, even before the war, Woodrow Wilson had successfully transplanted the spirit and some of the structure of the English tutorial system to Princeton. He called his program the preceptorial system and arranged for the assignment of upperclassmen to preceptors and for the reduction of preceptorial classes to not more than half a dozen students. Other institutions have followed the Princeton lead, particularly Harvard which early during the administration of President A. Lawrence Lowell (beginning in 1909) adopted the tutorial method for upperclassmen in all but a few instructional departments. In no American institution of higher education has the English system of tutorial instruction been completely adopted, but the initiation and successful carrying forward of several similar plans attests the return of English influence in American higher education.

Another English precedent has come into at least a hundred colleges: the honors course, an adaptation of the honors work done at Oxford and Cambridge. The initiator and chief proponent of this program is a former Rhodes Scholar and the official representative in the United States of the Rhodes Scholarship Trust: Frank Aydelotte, president of Swarthmore College. The honors student is, in general, selected after two years of college work to specialize in one or more related departments of instruction. He then, under the tutelage of a member of the family, works in a limited and specialized curriculum unrestrained by the usual requirements of class attendance. He is selected because he is considered to be an unusually able student and is assumed to be likely to do better work as an honors student than he could in the usual academic moulds. Thus he is held responsible for a thesis and for the passing of comprehensive examinations.

The third influence from England relates to the objectives

of education. The Germans asserted that the responsibility of education related only to the training of the student's mind. They had no interest in him as a person. What he did with his time outside of class hours, or indeed between matriculation and final examination, no official of the German university knew or cared. This impersonal attitude contrasted sharply with the British scheme of things and also with the American. As already indicated, however, the German point of view rapidly superseded the English, and American colleges and universities became as thoroughly impersonal as the traditions of the country would permit. The same reaction which set in against the abandonment of housing programs served to call a halt to the intellectualistic philosophy in other directions. In this movement President Lowell of Harvard, Eliot's successor, took the lead. Taking issue with the intellectualism of Eliot, he opened his inaugural address with this paragraph:

> Among his other wise sayings, Aristotle remarked that man is by nature a social animal; and it is in order to develop his powers as a social being that American Colleges exist. The object of the undergraduate department is not to produce hermits, each imprisoned in a cell of his own intellectual pursuits, but men fitted to take their places in the community and live in contact with their fellow men.[88]

This utterance served as a clarion call to hundreds of other administrators and professors who deplored the German inroads, and they set about to bring back the personal factor to American higher education. Since most professors continue to give most of their energies to research and scholarly work, the administrative problem of working with students individually and outside the classroom has been handled in various ways. Harvard and Yale and many other institutions have attempted with some success to individualize instruction. Others have put their chief faith in specialized administrative officers called personnel workers: deans of men, deans of women, deans of freshmen, directors of admission, social directors, student counselors, vocational counselors, dormitory

[88] A. Lawrence Lowell, *At War with Academic Traditions*, 1934, p. 32.

directors, directors of placement bureaus, and a variety of others. The student personnel movement and individualized instruction are not mutually exclusive since at many institutions they exist parallel to one another. Such administrative details are not here important. What is important is the fact that the intellectualism, the emphasis upon the intellectual training of the student exclusive of all other considerations, has largely been abandoned.

In summarizing the influence of European universities upon the institutions of higher education of the United States two statements concerning the current situation seem pertinent. One is from President Hutchins of the University of Chicago who was recently reported to have observed that if the political and economic jumble in Europe continues, "American universities will soon be the finest in the world despite themselves." The other is a judgment written by Sir James Bryce:

> . . . if I may venture to state the impression which the American universites have made upon me, I will say that while of all the institutions of the country they are those of which Americans speak most modestly, and indeed, deprecatingly, they are those which seem to be at this moment making the swiftest progress, and to have the brightest promise for the future. They are supplying exactly those things which European critics have hitherto found lacking to America; and they are contributing to her political as well as to her contemplative life elements of inestimable worth.[34]

Bryce wrote this statement before the turn of the century, and when he published a new edition of his great work in 1915 he made this addition to his original observation:

> The European observer can express now with even more conviction than he could twenty years ago the opinion that they (American universities) constitute one of the most powerful and most pervasive forces working for good in the country.[35]

If Bryce were alive today and still commenting upon American life, he would more than likely reiterate and perhaps make even more enthusiastic his judgments of fifty and twenty-five years ago.

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[34] James Bryce, *The American Commonwealth*, Vol. II, 1915, pp. 741-42.
[35] *Ibid.*, p. 762.

Individual Differences and the Tax-Supported College of Liberal Arts

By PAUL P. BOYD

I HAVE heard that in Colorado the processes of smelting ore became so improved as the years went by that it actually paid to rework the old refuse material for the extraction of additional metal. Unfortunately, when our college machinery turns out a more or less finished product there is no running it through improved machines. Our mistakes are irrevocable. We do have the opportunity, however, to profit by experience and to devise improved procedures for the new supply of raw material. Part of our trouble now is that we haven't replaced our original-patent out-of-date machinery. Our potato peeler was designed for big smooth ones, and we throw away those that don't fit the machine; we now need flexible machines to handle the small potatoes. We built a mill for the processing of the perfect grain; we now find that it doesn't handle the ungraded grain so well and that we are forced to add grading machines to our plant.

We are none of us satisfied with the results we are getting. We seem to be inefficient, wasteful of human material, and costly. Perhaps no factory could long stay in business, no machine would long be tolerated with a coefficient of efficiency as small as ours. The high rate of mortality, the 50 per cent or more of our entrants who leave college before the junior year, the large number of course failures, the carefree indifference of students to our prescriptions as they seek refuge in extracurricular activities—these things weigh upon our minds. We are confronted with statistical evidence, such as the study by F. S. Beers of twelve Georgia colleges and ninety-one high schools, which shows that the "overlapping in achievement of college freshmen or sophomores and of high school pupils from the tenth to the twelfth grades is almost

incredible." We have studies like that of Paul L. Boynton at the University of Kentucky which find the mental ages of college students varying from less than twelve years to twenty. We have Campbell and Smith's test scores on entering freshmen in forty-six southern colleges which show that

> In no case during the four years represented was the median in any of the state universities and colleges, the technological and agricultural colleges or the teachers colleges of the Southern Association equal to the national norm for all types of institutions for a given year. In only twenty-five to fifty per cent of the private institutions was the median as great as the norm.

We have been oppressed with our impotence to deal skillfully and adequately with this mass of human material that does not seem to fit in with our present purposes and procedures.

It clarifies our thinking somewhat to set down various contributing causes to the well-nigh intolerable situation. Without doubt, our entrance technique is inadequate, undiscriminating, unscientific; subject-unit requirements do not tell us anything reliable about future college performance, as we very well know and have been shown. The astounding increase in secondary enrollment from something over a million in 1915 to over six million in 1934 and the consequent surge into college made worse by recruiting; the changes in social and economic life bringing new desires for higher education, new demands for courses and curricula, new cultural backgrounds; the large classes; the inadequate teaching technique; the lag in modernization of college objectives; the insistence upon scholarship and a vague concept of culture to the exclusion of other worthy ends; the refusal to introduce variety and to fit the college to present-day needs and the realities; the emphasis on research; the lack of real knowledge of student capacities, aptitudes, and needs; the demonstrated unreliability of grades as they are usually assigned—these and other probable causes will occur to you.

Part of the trouble is due undoubtedly to the college itself.

Many students have been declared unfit for college when their only deficiency was being in the wrong college. The college has been like a physician with only one medicine. If it happened to be what you needed you got well; if not, you died. The educational science displayed by the college was about equal to that of an old self-taught doctor who used to practice near my home in Arkansas. He is said to have given plantain leaf tea to a white man who got well; and the same medicine to an Indian who died. And he wrote in his notebook: "Plantain: Good for white man, but damned hard on Injuns." Some of the blame may even be laid at the doors of accrediting agencies which in their zeal to raise standards have produced uniformity and copying, and have discouraged variety of objectives and the experimental attitude. Also it is so much easier for teachers to immerse themselves in subject matter, in pursuit of knowledge for its own sake, than to study the student as an individual and his personal needs and his possible contribution as a citizen to the life of his generation. Education has been subject centered rather than student centered.

Reorganization has often been handed down from the rare atmosphere of academic omniscience for the imagined benefit of a theoretical average student, a plan evolved in an atmosphere of departmental loyalties and attained only after skillful logrolling. As one has put it, where there has been analysis of needs, it has largely been job analysis *in vacue,* with the student who is to do the job left out of the picture. Some of the trouble has been due to poor high school–college articulation, with the college lording it over the high school and the high school fighting for its self-determination something like the hunted patriots of Ireland. Part of the mess has been due to unsettled, tentative philosophies of education in both high school and college. Part is due to the bewildering extent and complexity of the instructional fields. The total result has been mass education without direction and adjustment and individualization. Some of the causes will give you comfort and something of an alibi, but responsibility

for others of them, like the failure of the college to adapt its objectives and its courses to present-day needs, to improve its teaching, its marking, to recognize and to take advantage of individual differences, cannot be dodged.

The outstanding resemblance in people is that they all differ. There are types and levels of ability. However narrow your selection for college may be, you will still have to reckon with differences in interests, traits, and inheritances. If you admit only red-headed students you will still have many shades of redness. The main objection to the curricula of the past, as Wood says, is not that their content has been wrong or irrelevant. The real objection is their inflexibility and their influence in obstructing adaptations to individual abilities and interests. Failing students who do not fit your form is individualizing education, but it is a poor excuse for adaptation. Planning work for the fictitious average is an inadequate substitute for planning for individual needs. Reorganization of the curriculum doesn't fill the bill unless it is based on thorough analysis of individual differences and needs. Only when we build on individual differences can we hope to approach Seashore's ideal of keeping each student busy at his highest natural level of achievement in order that he may be successful, happy, and good. Only thus can Dewey's Utopian Educational World be glimpsed, wherein the educator will be busy fitting the school to the individual rather than fitting the individual to the established educational institutions. Thus the doctrine of individual differences forces upon us a new approach, a change of direction, a different emphasis which shall have the student and his capacities and his needs as the point of departure.

This inescapable fact of individual differences has been, to be sure, something of a guide in the past. We have made a beginning, and many skillful workers are carrying on. The elective system was based on it, and the many recent devices for stimulating scholarship, such as the final comprehensive examination, independent work, honors courses, release from rules and restrictions, have come out of it. The more recent

basing of selection on two or more criteria, the sectioning of classes according to ability, noncredit and special-help classes, personal, educational, and vocational guidance including even psychiatric service, cumulative records, survey courses, general colleges, and so on—all such devices are founded on the idea that individuals differ in many respects over wide ranges. What we need now is to continue these efforts, extend them, experiment in college administration and differential education, adopt, much more widely, programs of testing and guidance, and formulate really meaningful and workable statements of college objectives. The doctrine of individual differences, when we or our successors have really thought the thing through and have found out how to know the student accurately and completely, and what ought to be done with him, and what place in society he can fill best, will lead to individual differences in college. We shall have not only better adaptation within a college but more varied adaptation of our colleges to more specific purposes. What retards these developments are mostly tradition, lack of knowledge, absence of the experimental attitude toward education, institutional poverty, and a certain inertia that goes with midnight oil burning.

It is my conviction that in this continuing progressive effort toward a more efficient functioning of the college in a changing society, the tax-supported liberal arts college must rethink the facts of its origin, its primitive purposes, and its special obligations and opportunities to its constituency. I am not disposed to quarrel with an endowed college which selects its freshmen severely, limits its enrollment, is ruthless in its elimination of students who do not conform to its ideal of scholarship as the main contribution to the good life. Such institutions have and always will contribute leadership of the highest type to our democracy. It is probably true, however, that such colleges would succeed more abundantly if they would more consistently capitalize on the individual differences of their so-called superior students. But the tax-supported college, while it will not relinquish its allegiance to scholarship

and research, must also serve and prepare for life the great body of less gifted secondary school graduates who wish to continue their secondary education through the sophomore year. It must aim for good citizenship and good "followership" as well as good leadership. You may put emphasis on the four years as a unit, while we will incline to the idea that freshman and sophomore years are essentially a part of the secondary school period and should be occupied with the student's social, civic, and political responsibilities, while the upper division is for the select group who should qualify for scholarship and superior service in the learned professions. Let's don't step on each other. "You may take the high road and I'll take the low road and we'll all get to Scotland"—about the same time.

If there is truth in this claim for the fundamental and distinctive function of the tax-supported college in our American economy, it becomes immediately evident that such a college must apply all the facts of individual differences and all that follows from them in the way of differential treatment, especially in behalf of the students who are not likely to continue in college beyond the sophomore year. We must know all there is to be known about the student and let him know himself.

C. C. Ross and I conducted a controlled experiment at the University of Kentucky last year from which we found that those low rating freshmen who were informed of their ratings and were advised in a friendly way of what low rating really means, and were encouraged to act accordingly, did distinctly better college work than did those who were not informed, advised, and encouraged. We must help the student adjust himself to the college and we must adjust the college to him. With Seashore we must realize that "squeezing into the same form those who are by nature and training radically different in their equipment and ability . . . is indefensible." For the poor student we must provide "kindness, comfort, justice, and opportunity for relative efficiency and approbation." We must have courses adequate to their needs, suited to their abilities

and interests and traits. We must attain individualization in the midst of mass education.

This ideal for the tax-supported liberal arts college involves the admission to the lower division of all graduates of accredited public high schools. It involves better high school and college articulation, the concept of education as continuous, and the adoption of the cumulative record. The college cannot get too far away from the high schools that feed it. The college is a part of the public school system, and it should accept diplomas as certificates for promotion. Selective admission is justified only on the ground of the expense. We are admitting now practically all of the high school graduates who apply; the subject requirements do not discriminate as to ability and are an unjustified restriction of the self-determination of the high school. We should, and we might as well, receive all graduates of accredited high schools and then endeavor to find out what they are like, guide them, provide for their deficiencies, furnish them with instruction fitted to their abilities, their aptitudes, their interests. Differential treatment is the answer to the problem that arises from the duty and the privilege. Those for whom we can do nothing we should, when we find it out, bid good-by; those who are capable of a specialized adapted regime but who are demonstrably unfitted for the genuinely higher education of the upper division would depart without resentment or humiliation. This would be an optimum selective admission. Trial by actual participation in college work of appropriate type is the most nearly infallible test.

For such a program I am hesitant to put faith in special administrative units, such as the General College at Minnesota, which becomes a rival to the liberal arts college and will always run the risk of being dubbed a "dub college." I am doubtful about the panacea qualities of the survey course, rosy as are the reports of some administrators and the results of some student polls. Perhaps I am, myself, suffering from the aging process, but I incline to believe that there is some saving salt of judicious conservatism in the reluctance of many

college teachers to rush to the new banner and some validity to the claim that such courses tend to be easy and superficial, too scattered, too diffuse, too likely to lack depth along with the spread. Mathematics teachers don't, as a rule, care for "scrambled" mathematics. May it not be that the answer to the question of survey courses is to be found here in the differential treatment of our lower division students and that this type of course is pre-eminently suited to those who appear not to be of upper division quality. In any case, it seems clear that survey courses that do not embrace individual differences in their program must fall short of maximum effectiveness.

With such things in mind as guides, we are proceeding, with caution, to work out within the College of Arts and Sciences at the University of Kentucky a program that will provide for every student the best possible college experience, and that will last as long as possible for him. We are promoting first the state-wide testing program in our high schools and are urging the development of a guidance program that will continue into college with the cumulative records. The Colleges of Engineering and of Commerce are refusing to admit ninth- and tenth-decile students until they have shown by their first semester's work in Arts and Sciences that they are adapted to these professional courses.

All of these low raters, as well as those students who were placed on probation at the end of the previous semester, are put under the care of a special officer who helps them with their schedules, advises with them, studies them, organizes special-help classes for them in the freshman subjects, keeps a record of their successes and failures, tabulates the success percentages in the various subjects, organizes study classes in the dormitories, appoints student tutors, and encourages the establishment of departmental coaching hours.

We propose to work out a two-year program which we think will be appropriate to the low raters in subject matter and in methods of instruction. Some of our present courses will be used and some will be new, some of the survey type and some of special remedial character as in reading. Some

of the courses will not count toward graduation while others will count if the grades are *A* or *B*. Class sectioning will, of course, continue.

The first year, especially, will be exploration for the students and the teachers. A student will not ordinarily be dropped until it is demonstrated that there is nothing that we can do for him. Many students will doubtless, as happens now, be barred from the upper division, either by themselves or by the administration. But we shall endeavor, as we go along together, to lead those who have reached their limits to see that life beyond the sophomore year in college would not be happy for them.

Such in brief is our adaptation of the ideas usually associated with the general college. We are trying to be selective, adaptive, and experimentally minded. It is a start that may lead us to a satisfactory solution of the problems that arise from individual differences and inhere in the functions, as we see them, of a tax-supported liberal arts college in a democratic society.

I imagine that complete answers to problems arising from differences involving abilities, aptitudes, interests, ideals, habits, family influences, vocational plans will never be attained, the human elements being so hard to handle with scientific precision. But we all know enough to start, to experiment, and to check. We will go a long way on the road if we can have tests that are increasingly varied and valid, a program of testing that is a regular feature of school and college work and records that are full and cumulative, guidance that is skillful, wise, and scientific, and differentiated programs and teachers that are fitted to the students and in harmony with the objectives of the college.

This won't be nearly so hard as to put, in the words of a friend of mine, Garfield on one end of a log and Johns Hopkins on the other.

Ten Tests of Measurement

BY MARK A. MAY

IN CURRENT literature on education and psychology the words "tests" and "measurements" are used freely and interchangeably in spite of the fact that everyone knows that mental tests do not really measure mentality in the sense that meter sticks measure length or that thermometers measure temperature. The justification for the free use of these terms seems to lie in the fact that both testing and measuring are processes of comparing, contrasting, or discriminating objects, events, and performances. In the language of daily life we speak of one person being taller or shorter than another and in the same breath we may also note that he is more intelligent, or handsomer, or more extraverted. Quantitative comparisons or contrasts of this sort are seldom misunderstood and greatly facilitate communication and human relations. Since tests and measurements seem to serve the same general functions they are therefore used as synonyms.

But in science the situation is different. The necessity for close and accurate thinking forces us to give very precise definitions to terms and in so far as possible to allow each term one and only one meaning. Now in the physical sciences the word "test" has one meaning, and "measurement" another. A test is a crucial trial or a decisive examination; for example, in chemistry it is a reagent. Measurement is a quantitative comparison. The function of a test is to make precise discriminations, to answer such questions as whether *A* is longer, shorter, thicker, smoother, or even more intelligent than *B*. The function of measurement, on the other hand, is to determine *how* tall or *how* heavy or *how* intelligent *A* is without direct comparison with *B*. A test is a critical experiment or operation that determines a relationship; a measurement is an operation that determines an amount.

The only justification for all this hair-splitting is that good scientific work demands it. As long as we operate in the general field of human engineering and deal with broad practical problems of education we may use the terms "tests" and "measurements" quite interchangeably without danger; but if we assay to do exact scientific research, then it is necessary that we be more meticulous in the meanings attached to words.

Books on the logic of measurement teach us some important lessons about how the ability to measure things in the physical world has actually been achieved. We learn, in the first place, that the physical measurements which we now make with such great ease and certainty are the products of a long series of experiments, many of which go back to the dawn of history or earlier. The crucial experiments which gave validity and certainty to these measurements may now be singled out and described. They constitute a kind of an entrance examination which every candidate for admission to the fraternity of measurable things must successfully pass.

Second, we learn that there are two classes of members in this fraternity, *fundamental* and *derived,* sometimes referred to as *direct* and *indirect*. Let us say that these correspond to active and associate members. Fundamental measures must pass all of the experimental tests and meet all the requirements. Derived measures, on the other hand, are required to pass only some of the tests. There is still a third class which Ritchie has called *quasi-measurements* and which other writers have called *measures of intensities* which are not really full-fledged members but rather active candidates for admission.

In the third place, we learn that most instruments of measurement are developed or invented *after* the crucial experimental tests have been passed and not before the process begins. The instrument is an end product. At the very least it represents an advanced stage in experimental inquiry.

Fourth, we learn that the role of numerals, statistics, and mathematics in measurement is an instrumental one and that

great care must be taken lest we confuse the quantity to be measured with its numerical representation. Numerals are used for two reasons: first, they enable us to make contrasts and comparisons between things which are widely separated from each other in time and in space (they are a kind of a third party, as it were, which permit us to make comparisons which would otherwise be quite impossible); second, they can be manipulated much more easily and economically than the quantity that they represent. But we can never assume without experimental tests that manipulations that are possible among numerals are also possible among the quantities that they represent. This assumption leads to no end of confusion and accounts to a considerable extent for the difficulties that have been experienced in our efforts to measure social and mental phenomena. To make the point more explicit, let us suppose that individual *A* has a sigma true score of +1 on an intelligence test and individual *B* has a sigma true score of +1.5 on the same test. Now it is very easy to add these two scores and get a total of +2.5, but what does this +2.5 mean? Does it mean that if *A* and *B* put their heads together they could produce an intellectual product or products that are exactly equal to those that could be produced by an individual *C* whose sigma true score is +2.5? Or again, suppose that *A* has a true score that is 1 sigma above absolute zero and *B* has a true score that is 2 sigma above absolute zero, can we say that *B* has twice as much intellect as *A*? Or that *B* has as much intellect as two individuals with scores of 1 sigma each? We cannot unless we can prove by experiment that intelligence is an additive quantity. As we shall see later, the belief that quanta of abilities can be multiplied if only we can start counting from absolute zero is unfounded. If intelligence is truly nonadditive in nature, counting from zero does not change this fact.

We learn in the fifth place that there are three general uses of numerals. First, they are used as tags or labels for identifying football players, prisoners, books in a library, houses on the street, and so on. Second, they are used to designate

ordinal arrangements or series in which the gaps or steps between the members of the series are unknown or unequal. Third, they are used to designate collections of things. Any collection of five objects carries the label "5"; any collection of ten objects carries the label "10," and so on. This is known as the cardinal use of numbers. It means that as we go up the number scale, each collection has one more item in it than the preceding one and one less item than the next one and that the series starts with the number one. This cardinal use of numbers is capable of a great many manipulations for the reason that the collections represented by the labels can themselves be physically manipulated in ways corresponding to the addition, subtraction, multiplication, fractionation, squares, cubes, and so on of the labels. There are, however, possible manipulations of numerals that cannot be readily matched by physical manipulations of things that they represent. But the important point is that the numeral that represents a quantity is not the same thing as the quantity itself.

Going back now to the analogy of the fraternity of measured things, we find that the active members, if not indeed the charter members, are such things as length, time, weight, area, volume, and other measures of extension. It is a very select and limited group. Among the associate members (the derived measures) are temperature, density, energy, and velocity, to mention a few, all of which have been derived from the fundamental measurements.

Psychologists and educators have nominated no less than one thousand candidates for admission into this fraternity. It is an interesting game to line up these candidates, present them with the entrance examination, and see how well they can do. In an abbreviated form the entrance examination is the following: (1) It must be demonstrated that the candidate really exists and is not a fiction of imagination. Satisfactory proof that it exists consists of pointing to objects or performances that are specimens of it or that can be proved to be expressions of it or that possess it as a property. (2) It must be experimentally shown that it exists in amounts. This may

be done by devising an experiment that will demonstrate that at least two specimens of it have unequal amounts. A more satisfactory proof is to find a series of specimens that can be arranged in *order of amount* from greater to less. (3) It must also exist in equal amounts. Specimens must be found or experimentally invented which are precisely equal in respect to it. (4) A suitable standard specimen must be found that can be used for comparing other specimens in respect to their equality or inequality. This standard is usually called the "unit of measurement." The size of it is quite arbitrary and is a matter of convenience. (5) A serial order of specimens must now be arranged to which cardinal numerals can be assigned. This is most readily done by taking the unit or standard as the first member of the series, and then determining by experiment a second member that is twice the amount or size of the standard, then a third member that is three times the standard, and so on. Experiments that are appropriate to this determination vary with the nature of the candidate. (6) Requires an experiment that will show that the *order of addition* of the quantities in question makes no difference in the results. If we begin with a quantity A and add to it the quantity $(B + C)$ we must get the same result as we would if we started with the quantity $(A + B)$ and added C. This is known in the logic of measurement as "the associative principle." (7) It must be shown by experiment that the measured quantities will meet the requirement of the commutative principle, one expression of which is the ancient axiom that "if equals are added to equals the sums are equals." It has been found, for example, that some measures of illumination will not meet this requirement. (8) It must be shown that all of the rules above will apply for exceedingly small or exceedingly large amounts of the quantity in question. This is a very difficult test to pass. Even some of the charter members cannot pass it. (9) If the candidate is of such a nature as to express itself in positive and negative ways a zero point must be located and other experimental tests must be met. (10) The final test is to determine whether or not

an instrument of measurement can be devised and applied. Its major requirement is that some law relating the quantity in question to some other quantity or quantities must be found.

The reader who is familiar with the critical discussions of educational and psychological tests will note that we have not included in this examination a test for absolute zero. This has been omitted for the reason that the logic of measurement does not require it. The search for absolute zero in temperature was not made for the purpose of attempting to express amounts of temperature in a cardinal series, which could never be done because temperature is not additive, but rather to explore the properties of gases under extreme conditions. The only justification that the writer can see for assuming that nonadditive quantities become additive if counting of units begins at absolute zero is the fact that smaller and smaller units can be chosen as zero is approached.

All of this is by way of introduction to ten experimental tests which constitute the entrance examination which must be satisfactorily passed by all candidates for admission to the scientific fraternity of true measurement. The best way to apply these tests to the candidates that have been nominated by psychologists and educators is to assume that we start from scratch and that nothing is known about the candidate, not even that it exists.

Test I—For Detecting the Presence or Absence of the Quality To Be Measured

Suppose the candidate is intelligent. How can we be sure that it exists as a detectable quality of human beings in the sense that mass is a detectable quality of objects in the physical world? Can we find objects either animate or inanimate of which intelligence can be demonstrated to be a property or an attribute? From the standpoint of common sense this is a foolish question. Everybody, in civilized cultures at least, knows that it does exist. But for science it is not a foolish question because science demands that a reliable procedure for demonstrating its presence or absence be established. If a

physicist wants to know whether or not a body has mass, he knows *what* he must do in order to find out, and what he does depends partly on the size of the body, partly on its surroundings, and on other considerations. But whatever these may be he has certain "tests" that can be made, certain operations that can be performed, which will give him a reliable answer. He usually employs a "detector" of some sort which is an instrument for aiding his powers of observation. But the "detector" does not tell him what to look for; it only implements his sense organs.

Now common sense, which is so certain that intelligence exists in most humans and in some animals, cannot tell us where to draw the line between those organisms that have it and those that do not. It says to the psychologist, who wants to know whether an organism has intelligence, that the thing to do is to observe its behavior in certain situations, or to ask it questions, or to ask others about it who know its habits and nature, or to examine the work that it does and the products that it produces. This is good advice as far as it goes but it does not go far enough. It fails to tell us which performances in which situations are manifestations of intelligence and which ones are not, or what questions are sure-fire indications of intelligence, or what is an intelligent answer, or which products are of intelligence and which ones are not.

Suppose the psychologist turns to pure science and asks it what he should do to get a reliable determination of whether an organism is intelligent or not. He will probably get little satisfaction from this quarter, but he may get some broad hints that will lead him to examine the structure and dynamics of the organism itself. He may decide to examine its central nervous system (if it has one), or to make chemical analyses of the secretions of its glands, or measurements of the electrical potentials of its brain—in short, to find out all he can about how the organism is structured and how its structure functions. But this is slow going and very discouraging. It has not as yet given him much help on what

to look for, what chemical or other tests to make that will give him an answer to his question.

Another procedure that seems to offer greater promise is to examine the learning process of the organism. The rate and manner by which an organism learns to perform a graded series of tasks gives important clues to its intelligence. But not enough is known about how different organisms learn to be of much help in determining the presence or absence of intelligence.

So he returns to common sense and builds himself a crude kind of a "detector" that he calls an intelligence test. This is a very useful instrument because it not only "detects" the presence or absence of intelligence but it also, so he claims, measures the amount of it. When applied to certain individuals of a certain age range who read, write, and speak the same language and who were brought up in the same culture, it gives very satisfactory results for most problems of human engineering. But when checked against the criteria of science, it is very faulty indeed. First, how can the psychologist be sure that it detects only intelligence and nothing else? Second, will it detect the intelligence or absence of it in any organism? Third, if the intelligence of an organism changes, will it detect the direction, to say nothing of the amount, of the change?

This is, of course, the problem of validity. It is here divided into two problems. The first is that of the validity of the test as a test—i.e., a detector—and the second is its validity as a measurer—a detector of amounts. It is a question that does not as a rule arise in the physical sciences because "detectors" are not used in advance of a great deal of *prior knowledge* about the quantities to be detected. As we shall see later, most detectors and instruments of measurement in physics are expressions of laws which have already been established. For example, the balance is a detector of weight and is based on the law of the lever. Moreover, there are crucial experiments that can be performed that determine its validity as a detector of weight.

Without going into a detailed analysis of how test builders

validate their tests, it is enough to say that in general it is done by making a double appeal to common sense and to statistics. It is generally agreed that the best known way to tell whether an organism has intelligence or not is to *observe* its *behavior* (including language response) in certain test situations. But what type of performances or products is to be classed as intelligent for any given situation and for any homogeneous groups of individuals is a matter for common sense to decide. It does not help matters much to say that "intelligent behavior" or "intellectual products" are those produced by intelligent persons for the obvious reason that we are left to define an intelligent person. So Thorndike begins his monumental work on the measurement of intelligence by recognizing that the best that we can do at present is to say that an intellectual performance or product is one that "psychologists, scientists, and sensible people in general" regard as intelligent. He goes on to say "psychologists and scientists and sensible people in general readily rank tasks as easy or hard for intellect and would accept the principle that 'other things being equal the harder the task a person can master, the greater is his intelligence.' "[1] Thorndike has proposed two additional criteria which also appeal to common sense value judgments. One is that the greater the number of tasks of equal difficulty that a person can perform, the greater his intelligence, other things being equal. The second refers to the rate at which a person can produce correct responses. From these three criteria he gets his concepts of altitude, width, and area of intelligence.

The extent to which this appeal to common sense and to the judgment of competent people will satisfy the requirements of our first test depends on the consequences that follow from it. The consequences, as we shall see later, land us in no end of trouble.

In the first place, the judgments of common sense are for the most part *value judgments*. These vary from culture to

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[1] E. L. Thorndike, *The Measurement of Intelligence*, p. 22.

culture and from time to time in the same culture. Hence a scientific procedure that is based on them is culture-bound and subject to revision from time to time as these judgments change. Moreover, they vary from individual to individual and the question of who is competent to judge is hard to settle.

In the second place, if the "detector" is any improvement over judgment, how can it be validated by an appeal to judgment? For example, the balance is a more precise and stable instrument for detecting weight than is the process of "hefting"; hence no physicist would attempt to validate the *balance* by having a group of judges heft the weight. But "hefting" is a perfectly reliable means of determining whether or not some objects (not all) possess weight, and if the differences among objects are great enough it also gives stable discriminations. Moreover, experiments with "lifted weights" show that by averaging or combining the judgments of several individuals, or several trials of the same individual, much better discriminations are achieved. It is experiments of this sort in the field of psychophysics that have greatly strengthened the faith of psychologists in the use of statistical methods. But the judgments of length of lines, brightness of lights, heaviness of weights, or pitch of tuning forks are psychophysical processes that are quite different from the value judgments of human abilities. This accounts in large measure for the difficulties that are encountered when the attempt is made to meet scientific and logical requirements for true measurement by a joint appeal to common sense and statistics.

Before going on to Test II it may be noted that certain of the so-called educational scales fare much better on Test I than do tests of abilities. This is especially true of some of the so-called measuring scales such as handwriting, English composition, and spelling. The reason is that a critical, operational definition for the presence or absence of a quality to be measured can be formulated. Spelling, for example, is putting letters in an order to form words. This crucial test serves to distinguish spelling performances from other per-

formances. Hence the validity of a spelling scale is never questioned.

Test II—The Existence of Amounts or of Order in Series

Test I is designed only to demonstrate that the quality in question exists at all and to determine whether or not it is possible to find specimens of it. But before a quality can be measured it must exist in amounts. We cannot assume that because it exists it exists in amounts; we must prove it. A crucial experiment is one that will show that specimens can be found which can be arranged in an order from less to more (or vice versa) of the quality. The order of arrangement must meet three tests—transitivity, asymmetry, and stability. The logical test for transitivity is that if Specimen *A* and Specimen *B* are related in some way in a series and if *B* and *C* are related in the same way, then that same relation in that series must hold between *A* and *C*. The test for asymmetry is that whatever relation *A* may have to *B* in a series, *B* cannot have that relation to *A*. If, for example, *A* is greater than *B*, then *B* cannot at the same time be greater than *A*.[2] Combining the tests of transitivity and asymmetry the required order must be that if *A* is greater than *B* and *B* is greater than *C* and *C* is greater than *D*, then *A* must be greater than *C* and *D* and all other members below it in the series. Likewise *B* must be less than *A* and greater than *D* and *E* and so on. The test for stability is that these relations will not change. Once this order is established and stable the members of it can be labeled with the ordinal series of numerals.

How can such a series be established in respect to intelligence? It is required to find an individual *A* who is more intelligent than *B* or *C* or *D* or *E* and to find an individual *B* who is less intelligent than *A* but more intelligent than *C* and so on. How can this be done and be sure that the order is an

[2] This may sound like hair-splitting, but logicians are notoriously careful.

order of intelligence only and not mixed up with other things? In the case of weights the problem is easy, for either by common sense "hefting" or by the invention of a detector—the balance—it is possible to establish a series that meets all of the logical requirements and that is stable. The only method known in psychology and education for doing this is the appeal to statistics and especially to averages. It is done by grouping individuals usually by age groups and finding the average performance of each group. Hence the members of the series are averages. By the use of statistics it can be shown that performances can be found in which the average of group *A* is greater than that of group *B* and *B* greater than *C* and *A* greater than all. Moreover, by the use of averages the series can be made stable, provided the groups are properly selected. The only "out" about this procedure is that it assumes that the conditions of our Test I have been satisfactorily met and that the series represents only intelligence. This assumption is based upon a further assumption, namely, that even though the conditions of Test I are not met, the use of averages operates to eliminate or to "average out" all irrelevant factors. But of this we can never be sure.

In the case of handwriting or spelling scales, for example, the specimens of handwriting or of spelling which constitute the scale are more likely to be "pure" specimens of what they claim to be than is the case of abilities.

The justification of the substitution of statistical procedures for experimental tests that are used in the physical sciences depends entirely on the consequences that follow from it. One consequence which is well known and often referred to is that a series of averages can be used only when dealing with groups and not with single individuals.

Test III—For Equality of Specimens (or Expressions)

Test I is supposed to show experimentally that objects or performances exist which possess or express the quality to be measured; Test II is supposed to show experimentally that the quality exists in unequal amounts. This test is to show

that *equal amounts* of it can be found. The logical proof for equality is two-fold. First, if it can be shown that *A* is not greater nor less than *B* and if *B* is not greater nor less than *A*, then *A* and *B* are equal. The second test is that if it can be shown that *A* and *B* are always greater than or less than any given quantity *X*, however large or small *X* may be, then *A* and *B* are equal.

In the case of the CAVD test Professor Thorndike has attempted to meet this criterion by saying that two individuals *A* and *B* may be regarded as being equal in intellect, provided they can perform the same intellectual tasks under the same conditions and at the same rate and at the same level of difficulty. If there is a task which *A* cannot perform then it must be shown that *B* cannot perform it either, whatever the task may be. Equal intelligence means equal amounts, equal rates, and equal levels of difficulty. This criterion, however, is difficult to meet for individuals for the reason that the conditions of our Test I and Test II could only be met statistically.

We are therefore sentenced, as it were, to the continued use of statistics. For example, if we wish to determine the equality of difficulty of two tasks, this can be done only by group performances. If 70 per cent of a group can do task *A* and 70 per cent of the same group can do task *B* then we can say that *A* and *B* are of equal difficulty for that group. Similarly if we wish to compare two individuals in respect to levels of difficulty we can only do it by averaging a fairly large number of tasks. No experiments have thus been performed that will show that two individuals that are thus equated for amounts of intelligence have the same brain structure or glandular chemistry or are in any way equal in terms of internal mechanisms that lie back of the performances.

Test IV—For Equality of Units

Measurement is not possible until the quality to be measured can be represented by some convenient standard. The first step in this process is to select some arbitrary unit *X* and by its use establish a series that progresses by the amounts

equal to this unit. If the first quantity in the series is M then the second quantity would be $(M+X)$, the third would be $(M+2X)$ and so on. The series can now be measured (in a very limited way) according to some of the ways in which the number system can be manipulated. For example, if the third member in the series, $(M+2X)$, is labeled C, then $C—M=2X$, or $C—2X=M$ or $2X=C—M$. The experimental problem is to devise ways in which the quantities can be physically manipulated to match these symbolic manipulations. Until such experiments can be devised we can never be sure that the quantities can thus be represented. Statistical procedures, however, will show whether or not a series of average performances proceed by equal steps.

Test V—For a Cardinal Series

The series indicated above which begins at some arbitrary point M and goes up by equal units is still an ordinal series. Any number can be assigned to the first member of the series. In a cardinal series the number 1 must be assigned to the first member of the series. In order to do this it is necessary that the *unit of measurement selected be exactly equal to the first member of the series.* If this is true, the second member is twice the first, the third is three times the first, the fourth is four times the first and so on the series is cardinal. The establishment of such a series requires the performance of a crucial experiment which determines whether or not the quantity in question is truly additive. If we begin with a unit or a standard of measure, it is required to find a second one that exactly balances two units. In other words, two units must be somehow fused or joined together or otherwise physically put together so that they form a brand new object or specimen and a second one must be found that exactly matches it. In the case of weights this experiment could be performed very readily by putting two equal units on one side of the balance and finding some other object which as a whole exactly balances it. This test is crucial because, when its conditions have been met, then most of the arithmetical operations that can

be performed with cardinal numerals can be matched by experimental operations on the quantities that they represent.

For example, if when we square the numeral "2" and get "4" we are required to perform an experiment with the quantities to which these numerals are assigned that will show that when four units of suitable shape are placed together, as, for example, four square blocks of the same size, the result must exactly match another solid block of the same size, and the weight of each side is two units.

This is the test that really discriminates the direct from the indirect or the fundamental from the derived measures in physics. Density, for example, could not pass this test. If two equal units of water, each having a density of 1, are poured together the density of the resulting body is still 1. Physicists know that density and temperature and other phenomena are not additive quantities. Therefore they cannot pass this test.

In the case of tests of abilities, aptitudes, or achievements no amount of statistical manipulation will get them over this crucial hurdle. The favorite method employed by psychologists and educators to get around the requirements of this test is to appeal to the normal curve. The justification of this procedure is based on two sets of assumptions. The first is that the candidate for measurement has successfully passed all the tests up to this one, and the second is that the mathematical assumptions on which the statistical operations are based are in fact fulfilled by the data. One of these assumptions is, of course, that the phenomenon in question is normally distributed. But even if this assumption were true, there is still "one wide river to cross" and that is the one of performing experiments with the quantity that will match the mathematical operations on the numbers that have been assigned to it.

It is true that the base line of any curve can be laid off in equal space units. These units can be taken to match literally anything in the world. They are quite formal and quite universal. The fact that they are determined by frequency does

not solve the problem. If experiments cannot be performed that will justify us in adding raw scores, then no experiment can be performed that will justify multiplying or dividing, to say nothing of squaring sigma scores. No physicist would ever suspect that by appealing to the normal curve the non-additive phenomena of density or temperature could miraculously be transformed into additive quantities. The appeal to the normal curve as a way around the rigid requirements of Test V results in all sorts of logical absurdities. For example, it is assumed that sigma scores can be added, multiplied, and divided as though they were cardinals, but raw scores cannot, it being recognized that raw scores are only ordinals. Then the further assumption is made that ordinals can be transformed into cardinals by subtracting from each of them the mean of a frequency distribution and dividing the result by the sigma of the distribution. Really, all that has been done is to represent scores geometrically as equal distances on a line. But these geometric equalities into which a line may be divided have nothing whatsoever to do with whether intelligence is an additive quantity regardless of how it may be distributed.

It may be said that a good share of the enormous amount of statistical labor that has gone into test building is really an effort to find a way around this crucial difficulty. The writer is not sufficiently acquainted with this procedure to judge how well this has been done. Unfortunately most test builders do not publish full accounts of their procedures. A notable exception to this is Professor Thorndike's volume on the measurement of intelligence in which he requires a very full statement of the procedure that he used in building the CAVD test which seems to the writer to be the best of anything that has been done in the field of intelligence testing. Professor Terman[3] has also published a report of the procedures used in building the latest revision of the Stanford-Binet test.

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[3] L. M. Terman and Maude A. Merrill, *Measuring Intelligence* (New York: Houghton Mifflin Co., 1937).

It should be clear by this time that the effort to substitute statistical procedures for experimental determinations beginning with Test V in our series leads to consequences that become terrifyingly complex as we go up the scale of the five tests for measurement that we have thus far described. In the remaining five no further reference will be made to statistical procedures.

It is important, however, to note that the best chance that psychological and educational tests have of being admitted to the fraternity is that they go in as associate members or derived measures. Now in order to be an associate member of the society it is necessary that the candidate have the support of at least two active members—one who nominates and the other who seconds, as it were. These two active members must not only perform the service in making and seconding the motion, but they must also be prepared to support the candidate throughout. Density got into the fraternity on account of the support it received from weight and volume, both of which were active members. Density owes its membership, therefore, to the fact that there is a law that relates weight and volume. The same can be said of temperature and of all the other associate members. The question then arises as to what two or more active members may come to the support of some of our psychological or educational candidates. It is not likely that any of the active members would find it possible to do this unless, of course, we go into the field of physiology and neurology and try to base our case for the measurement of intelligence on some of the physiological, chemical, or electrical properties of the organism. Unless this can be done, the only way that I can see that educational and psychological tests can become members of the society would be for the society to decide to create a new order of members to be known as *statistical membership*. If such an order were created and if statistical members were admitted, then it is likely that at least the CAVD and the revised edition of the Binet test might qualify.

Test VI—For Order of Addition

This test requires experimental verification of the associative principle of logic which states that the order in which quantities are added should make no difference in the results. In the case of intelligence we would have to show that if *A* and *B* by working together can produce a certain product and if *C* joins the group and the product is increased, the total output should be the same as it would have been had we started with *A* working alone, then added *B* and *C* together or had we worked any other combination of the three. We would also have to prove that the products produced by *A*, *B*, and *C* working alone equal three times their joint products when they work together.

Test VII—For the Addition of Equal Units

This test requires an experiment which will demonstrate that if equals are added to equals the sums will be equals. Even if it were true that *A* has the same amount of intellect as *B* and that *C* has the same as *D*, would it follow that when *A* and *C* put their heads together the product would be exactly equal to that produced by *B* and *D* working together? There are researches in which tests similar to this have been made and which show that this principle does not apply in such experiments.

Test VIII—For Verification in Extreme Cases

This test requires that all of the above experiments should hold in extreme cases—that is, for quantities that are exceedingly small as well as for those that are exceedingly large. It is not important to dwell on this, partly for the reason that there is no psychological or educational test that even claims to measure aptitudes, abilities, or achievements in all ranges, and partly for the reason that in the case of physical measurement the test is an exceedingly difficult one to meet. It is doubtful, even, if the experimental test of the most basic measurement in physics, namely, that of length will hold in all extreme cases.

Test IX—For Negative Quantities

This test requires that an experimental determination be made to find out whether or not the quantity in question has negative values. If it does, then a zero point must be established and experiments must be performed to find out the extent to which the use of negatives in the algebraic manipulation of numbers can be experimentally verified.

Test X—For the Construction of an Instrument

Earlier in this paper it was pointed out that all measurement is essentially a process of making comparisons, contrasts, and discriminations and that such comparisons can be made among objects or performances that are separated in time and space by the use of a third party which is usually some standard or unit that is kept constant. An instrument may be either a convenient unit or set of units such as a foot rule, a yardstick, a micrometer, a pound, an ounce, or a milligram by which direct comparisons or contrasts can be made. It may be a machine or device which translates nonspatial units into spatial ones or brings about some other mode of transformation so that the amounts of the quantity in question cannot only be easily detected but easily *read*. Most measuring machines depend for their construction upon knowledge of a law which relates the quantity that is to be measured to some other quantity that is expressible in observable units, usually space units. Some of them are at the same time adding machines, because the total number of units or amounts can be read directly from the dial without going through the performance of counting them up. This, of course, is a great convenience and, in some cases, even a necessity. Many measuring machines therefore serve three functions: *detection, translation,* and *addition*. This cannot be accomplished without a good deal of advance knowledge about the quantity to be measured and about the laws relating it to other measurables.

Now the moral of all this for mental testing is that instruments of measurement come *after* the experimental re-

quirements of at least Tests I to V above have been met and after laws have been established between qualities that are directly measurable and those that are not. A measuring instrument is possible only *after* inquiry has proceeded a considerable distance and *not before* it has begun.

It is always possible, of course, to guess and on the basis of these guesses or hunches to build testing devices and try to use them as if they were measuring instruments. By trying them out and going back and improving them one may hope, by this cut-and-fit, trial-and-error method, to arrive ultimately at something useful. But this road is long, difficult, and paved with trouble. One is always in hot water over problems of validity, reliability, objectivity, and norms which never bother the physicist at all as long as he is measuring with devices that have been checked against and have passed Tests I to X above.

It is an open question as to whether or not some of the work and money that has been spent on the 1,200 or more testing instruments now available could not have been better spent in other lines of inquiry. It seems certain that some of it could have been spent in laboratories working on experiments designed to meet the logical requirement for measurement. On the other hand, most, if not all, of these 1,200 testing devices are really useful in connection with nearly all of the broad problems of educational and psychological engineering. The fact that not one[4] of them can satisfactorily meet the requirements of the first five tests described above does not rule them out of education entirely. It merely indicates that they are "tests" rather than "measurements" in the sense in which the term is used in the physical sciences. But many of them can pass the first three tests provided statistical procedures are admitted as substitutes for crucial experiments. Statistical procedures are, of course, admissible provided the results are interpreted as referring only to groups and group *averages,* and not to the individual members of these groups

[4] The Thorndike CAVD test and the Terman 1938 revision of the Binet test may be exceptions.

except in cases when the individual is the group in the sense that he has been tested with a sufficiently large number of tests to permit him to have an average and a standard deviation all his own.

It is not the intention of this paper to admonish psychologists and educators for using the terms "tests" and "measurements" as synonyms. Everyone understands that this is merely a convention. No harm results as long as we are not blinded to the need that exists for the basic experimental work that must be done before we can really measure some of the important phenomena in mental and social life. The fact that our tests are satisfactory for engineering purposes does not guarantee that they can meet the stricter requirements of the laboratory. It may be that the testing movement or some part of it will soon, like the prodigal son, return to its father's house—the psychological laboratory.

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The Living University

By C. R. MANN

EACH year we send a great group of our children to school for the first time. Parents and community alike are solicitous that the primary schools which admit them are "good" schools, well adapted to the task of helping all the children so to learn as they pass through the successive school grades that they mature as the constructive, adult citizens of tomorrow.

Do any of us at the same time recognize that the great body of institutions of higher learning, the colleges and universities of the country, are of immediate significance to these children entering the grade schools? Of course, even on the first day of primary school, our noble American aspiration to keep the way open for all children from the kindergarten to the university may cause many to take it for granted that the university will be the desired terminal point of each youngster's formal schooling. But do any of us realize that current university policies and practices actually affect the daily life of the little boy and girl from the very beginning of their respective school careers and with increasing force as they advance through the elementary and secondary schools?

This will not appear to be an utterly abstract question when one examines concretely the facts concerning the results wrought by the university in the American school system. In effect, the action of the university in the school system symbolizes very accurately that of the heart in the human system. In much the same way as centralized control of the life-giving stream is vested in the heart, so there is vested in the university the centralized control of the life-giving stream that keeps the whole school system alive. Careful study shows that the current practices in the lower levels of schooling are determined largely by the way the university defines

and administers its own regulations for admission and for advancement toward graduation. These regulations usually specify clock-hours that must be spent in various courses of study, prerequisite numbers of courses for special degrees, numbers of semester hours for academic credit, months of residence, and other tangible factors that can be tabulated on student record cards. When a student's record card shows that in the lower schools he has "passed" the specified number of courses with grades not below a specified percentage, he is admitted to college to work for a degree. When he meets corresponding requirements in college or university he is granted an academic degree.

As President Conant, in his recent annual report, pointed out, the lower schools have tended to set their scholastic standards and define their curricula in ways that seem to the school men most likely to help the student satisfy college entrance requirements and other academic regulations at higher levels. Under these conditions as many as possible of their students try to honor the lower schools by proving that they are "prepared for college." This briefly defines the major responsibility that lower schools have voluntarily assumed as their best contribution to the life of the whole school system. The university thus receives from the other members of the school system the kind of cooperation which is demanded by the university and which is popularly considered worthy of accreditation. This is regarded as a satisfying demonstration of harmony, cooperation, and order from the point of view of the mechanical aspects of the school system. It builds up the institutional prestige of any school that is accredited because it seems to perform its respective tasks competently in the current, well-knit, and smooth running system. And most schools seem to prefer to be popularly recognized for this kind of mechanical competency. It supplies tangible records of tangible results that look like proof of educational achievement.

At present the public seems to approve current school practices by sending increasing numbers to schools at every level

and by raising the age of compulsory attendance. Most states have truancy laws which are so well enforced at the elementary school level that over 97 per cent of the children from 7 to 14 years of age attend school. At the secondary school level, comprising age groups 15 to 18, the percentage is rapidly increasing toward 70 per cent while at the college level, age groups 19 to 23, it is increasing rapidly toward 12 per cent of those of college age.

The ideas that "preparation for college" is the role of the lower schools and the granting of degrees the role of the university are being increasingly taken for granted by the American people. Consequently the effort to have more and more of our youth attend institutions of higher learning is growing yearly more intense. This effort is being aided and abetted by the fact that government and industry are constantly demanding additional university training for their personnel as prerequisites for appointment to paying positions. Such material pressures tend to make impersonal university training appear as a goal in itself, the achievement of which by a student is synonymous with achievement of the values and personal goals each one sets for himself.

Under the influence of such popular pressures an individual college graduate's attitude often develops into one of smug satisfaction because he has received such university insignia. Frequently this kind of personal satisfaction is shaken by the disillusionment that follows when he finds by experience that such tangible records of university training do not necessarily help him to achieve purposes that are close to his own heart's desire. More frequently this attitude leads a college graduate to demand college graduation as a prerequisite for employment in his own office. For this reason many who do not go to college are deprived of the opportunity to make the best possible use of their own capacities for service and the employer cuts off his own nose to spite his face.

Further objective evidence of the results of this trend toward higher education for more and more people may be found in the experiences of the many college graduates who

yearly leave school and try to do their share of the practical work of the world in industry, in government, or in the professions. Many of these seem in practice less mature and more poorly trained for the business of living than are those who have educated themselves while working their way up from the bottom of the ladder. Therefore, to many university men it seems fair to conclude that the percentage of students who receive the present kind of university training is far too large and should be limited to those few born scholars who are helped by current university practices to achieve the mental, moral, and intellectual integrity which we expect the schools to foster in all our children. The percentage of college students who achieve this desired result from their college experience, we believe it may be shown, is much less than the 12 per cent now admitted to college.

This trend is placing the university in a position unfavorable to the best accomplishment of the larger and more significant half of its dual purpose. For if the university is thought of as the heart of the school system, it ought to have a dual purpose analogous to that of the human heart. The human heart has both a material and a spiritual function. We think and speak of the heart as the center of love, longing, dreams, aspirations. The heart's desire is often mentioned as the origin of any quest in life. If one's adventure succeeds, he is said to enjoy heartfelt satisfaction and contentment. So with the university. It ought to express our love of truth, our longing for mature growth and wisdom, our aspiration for intellectual integrity and excellence. From this point of view, the vast chain of institutions of higher learning becomes a symbol of the willing sacrifice of a whole people in the interest of these spiritual ideals.

It should be remembered at this point that there are approximately nine million of our youth in the four-year age group appropriate to college or university training at any given time. The institutions of higher learning actually enroll about one million, or less than 12 per cent and this group is not drawn exclusively from those of highest potential mental

capacity. Fairly recent statistics show that nearly 70 per cent of the brighter youth (A and B on the Army Alpha test) do not enroll. There is also a companion fact of great significance when we look upon the university as the symbol of spiritual ideals, namely, that in this same college age group, 19 to 23, most young men and women begin to meet such basic issues as: What occupation shall I choose? Whom shall I marry? Where shall I build a home? All must settle such questions for themselves whether they attend the university or not. It is also not without significance that this same four-year age group records the greatest percentage of criminal careers, 19 years being the average age of the criminal element in our population. Again, this age group is perhaps most greatly affected by depression and unemployment. About 40 per cent of the unemployed on record are in the college age group. This unemployed group is made up largely of those who are able to get only temporary or makeshift jobs unrelated to their career objectives, and of those whose opportunity for first employment has been retarded by economic conditions.

Under conditions such as these, does the university justify its position of central control in the whole school system by influencing the lower schools, which actually serve this group before they reach these critical years, to "prepare them for college?" Since it is neither possible nor desirable that all the children of all the people actually enroll in institutions of higher learning, it becomes obvious that the university does not justify its place of material and spiritual importance in the school system by coercing the educational programs of the lower schools in the interest of college entrance requirements and regulations for college degrees.

In its role as the heart of the entire school system, the university ought to be a living organ, giving a living stimulus to the lower members of the system which ought, in turn, to give a living experience to each child at every level, appropriate to his personal school needs as he goes along. In other words, the university, as the stimulus of the lower schools as to pro-

gram and objective, has both the opportunity and the responsibility to define and administer the academic regulations at its own level in such manner that the whole school system at every level may better help every citizen learn to meet constructively the problems of his daily life, whether such level be the terminal point of his school experience or preparation for advanced schooling. In short, the living university may use its powers of centralized control to stimulate the lower schools voluntarily to assume a decentralized responsibility for helping each child get from his particular school experiences as complete an individual education as is possible for him.

Having adopted this liberating point of view, there appear many practical ways by which the university can function effectively as the living heart of a living system. For example, the university may seek out more effectively the relatively few to whom university training furnishes a challenge because it offers them an effective means to achieve their own personal ends of scholarly maturity. Having found these students, the university should admit and serve them mainly without reference to inhibiting standardized requirements. This would liberate those who are really university "material" and would profit by university training, but who may not have amassed during their earlier school years the kind and number of credits now assumed so necessary for college admission.

Again, the university may extend its service beyond the intramural activities of the limited group that enrolls in its classes to the rest of the school system and the community at large by assisting in the effective definition of the critical issues in industry, in social and municipal relationships, in politics, and in commerce. All such features affect the daily lives of all the people, many of whom will never enter a university to study these questions in an academic way. In order to accomplish this, the university ought to transform its present coercive system into a more facilitating system that makes vital contributions to the liberal and practical education of everyone.

In this connection, the attitude of the members of the university faculty plays an important role. A large percentage of college graduates go into the teaching profession, usually seeking appointment as teachers in the lower levels of schooling. These would-be teachers often transfer to the lower schools the attitude of their college professors toward schooling. A constructive change of attitude of professors in the university is likely to produce similar changes of attitude among teachers at the lower levels. The lower schools need teachers imbued with a spirit of service to the pupils rather than with an aspiration to prepare youth for admission to college.

These suggestions touch only a few of the many ways in which the university may serve as a living force in a living school system which may safely serve as the bulwark of a lasting democracy.

From the beginning of our nation we, as a people, have recognized our dependence upon education to insure the enduring success of the democratic way of living. Occasionally, at some critical time in our national life, our documents of state set forth this dependence in no uncertain terms. For example, during early Colonial days the General Court of Massachusetts decreed in 1642 that those responsible for schools should, from time to time, determine that all the children could "read and understand the principles of religion and the capital laws of this country." When the United States had won its independence and was laying a foundation for future growth, the Northwest Ordinance of 1787 justly linked together religion, morality, and knowledge as "necessary to good government and the happiness of mankind." Seventy-five years ago, during the Civil War, the Congress gave each state a fair portion of the public domain "to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

These are now critical times, not only for our nation, but for civilization itself. Never have we needed more to make education a constructive force in American life. Consequently,

never before have we needed so sorely to determine correctly the role of the university in serving the true needs of education in our democracy. In his book, *The Affirmative Intellect* (1901), Charles Ferguson says: "The real battles of history —those that have issues—are those waged between the men of affirmative and creative intellect on the one side and the men of negative and passive intellect on the other."

A living university, a pulsing, stimulating, life-sustaining heart of a great school system is needed today. Therefore, the present challenge to schools is to discourage the passive intellect, which usually is satisfied to conform to traditional practices, and to help build in every individual an affirmative intellect, which may help him make more constructive use of all the experiences of his life, especially his school experiences, as a means of achieving a vital education for himself.

In trying to meet this challenge every college teacher has his chance to contribute his "widow's mite" to help revive the affirmative intellect with a firm faith that, as Robert Louis Stevenson says:

> Away down the river,
> A hundred miles or more,
> Other little children
> Shall bring my boats ashore.

The College's Interest in the Secondary School*

By HARL R. DOUGLASS

FISHER AMES, fiery young senator from Massachusetts once said, "Monarchy is like a full-rigged ship which sails proudly out of the harbor until it strikes a rock and sinks. Democracy is more like a raft. It goes neither fast nor far, nor does it sink, but, damn it, your feet are always wet." Secondary education in America is likewise cumbersome, starry-eyed in ideals, and heavy of foot. It suffers peculiarly from severe chronic social lag which saps life from all social institutions. It is an apt example of the epigram of Bernard Shaw who said, "Education is always driving the tacks where the carpet used to be."

The problems of secondary education are peculiarly aggravated and its shortcomings consequently exaggerated by the twin facts that the United States is the only country which makes any serious attempt to provide secondary education for all the children of all the people and that only in this country is the education of all secondary school pupils attempted in the same type of school. The effects and the challenges of these unique undertakings of the American secondary schools have become increasingly significant within the last few decades.

One of the greatest problems of the secondary school as we recognize that institution today is the adaptation of its curriculum to what is approaching a constituency of all young people of high school age. This problem is not nearly as simple as many seem to think. In the first place, it is not clear that the variations in general mental abilities is much greater among high school pupils today than a quarter or a

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half century ago. There have always been many pupils of limited abilities in secondary schools. Equally important is the fact that universal secondary education means that children are coming in large numbers from homes of a lower socio-economic and cultural level.

Teachers and administrators should seriously study the effect of this type of home environment on the problem of education in school—what it means for the curriculum, for objectives, for methods of teaching, discipline, and guidance to have boys and girls coming from homes characterized by the absence of the decent comforts of life, by a lack of morale and character on the part of parents, by an absence of appreciation of things intellectual or aesthetic, or perhaps even moral. They must determine how these conditions tend to give direction to the activities of the school so they will be effective in helping these unfortunate boys and girls rather than exaggerating their maladjustments. What is of even more importance, these young people are going into every occupation in which adults will be engaged in future years. They will be factory hands, lawyers, waitresses, physicians, five-and-ten cent store clerks, ministers, unskilled laborers, teachers, skilled construction workers, stenographers, dentists, nurses, farmers, and salesmen, and wives of these workers. That this means much readjustment of the curriculum is probably clear to most of us. But upon its implications we are not agreed. There are those who, after superficial consideration, advocate simply the expansion of the program of technical vocational education. The unfortunate increase in unemployed youth during the depression seems to validate that theory.

The limitation of vocational education as a major means of adapting the program of the secondary school to its present constituency are numerous, reasonably obvious, and unavoidable. Technical vocational education can be given in any school or in a city system of schools, however large, in but a small number of the thousands of types of vocational jobs. If all youngsters are trained for these few types of occupa-

tions in which school training can be given a serious maladjustment between demand and supply for workers will develop. For many positions employing several millions of workers, it is impossible to set up situations in the school which have any considerable practical value for training in specific vocational skills. Even though this is possible for some types of employment, for many occupations employing millions no vocational training is necessary other than that which may be acquired on the job in a few weeks or months. The problems involved in the uniquely expensive nature of vocational education and in helping young people of the age of 14 or 15 to choose a vocation in which to be trained cannot be ignored. How some of us arrived at the conclusion that the total amount of unemployment will be reduced by increased vocational education defies all laws and rules of logic and reason.

Lest I be misunderstood as an opponent of vocational education or a champion of the outmoded vested interests points of view, I wish to make two things clear: first, that vocational education in many fields should be carried forward, encouraged, dignified, improved, respected, and made available to young people in all parts of the country; and, second, that the so-called academic subjects of science, mathematics, English, and social studies should be quite radically revamped to yield far greater vocational values as well as values in other directions. These subjects should yield recreational, civic, health, and home membership values for future workers and citizens of lower socio-economic levels.

From the point of view of the college, we have certain special interests in the secondary school. The college is legitimately concerned primarily with two aspects of secondary education: first, that secondary schools do not permit more capable young people who should go to college to sidetrack themselves in a curriculum which fails to prepare for college; and, second, that the high school prepare for college, as well as may be done, its prospective college-going constituency.

Of course, college professors and college presidents have other interests in the secondary school as may be exemplified by the efforts of President Eliot of Harvard and others just before the turn of the century in attempting to begin secondary education earlier in order that the colleges might have more years in which to do their work. Another example is the unfortunate tendency of many college professors to bring pressure to bear upon the high schools to abandon their efforts to adjust the curriculum to all high school students and to concentrate on better teaching of the subjects thought to have unusual disciplinary or college preparatory values.

The college is much concerned that, while the mediocre and the dull are being provided for, the bright be not permitted to vegetate—to grow at less than their optimum rate and to develop bad habits and standards of study and work. The college is sincerely interested in seeing future college students study those subjects which will yield the greatest disciplines for college intellectual endeavor. It has traditionally favored these disciplinary subjects both by prescription and by energetic partiality in counsel and discussion. There was until recently little doubt as to the identity of these subjects. They were those which were the backbone of the high school curriculum as studied by the current crop of college professors, and were thought to be validated by the obvious superiority of its product in the past.

We are very much concerned today by the grave doubts and suspicions which the results of careful experimentation throw upon what we had assumed to be axiomatic. Study after study—Yates at the Universities of Kentucky, Cincinnati and Indiana; Sorenson at Northwestern; Boardman at Minnesota; Proctor and Bolinbaugh at Stanford; Bramwell at Washington, Stinnette and others at Colorado State Teachers College; and others—seem uniformly to demonstrate that for any given degree of intelligence and industry no subject or groups of subjects possess any worthwhile superior preparatory value. Students who have had little or no mathematics or foreign language, for example, make practically as high a

scholastic average as those of equal intelligence who have had more work in those fields, and those students who have several years' credit in vocational subjects do as well as those of equal intelligence with none. Only in the case of Latin is there an appreciable difference, and even there it is so slight as to make the prescription of Latin or any other foreign language for college entrance to undergraduate studies in general seem unworthy of competent leaders in education. And what is more disconcerting is that the number of credits earned in the preferred fields is correlated far less with the average mark in college than is the score on a forty-minute mental test. A mental test, in turn, is definitely less closely correlated with the average college mark than is the average high school mark.

How then is the high school to serve best its college-going constituency if not by steering them into college preparatory subjects? Dare I attempt to interpret in a few minutes the implications of scores of researches which throw light on this question, including a dozen projects conducted by myself and my co-workers in the last five years at the University .of Minnesota under the auspices of the University Board of Admissions?

To take the negative aspects first, students apparently are not prepared best for college work by either of the following means:

1. Having them take certain college preparatory subjects;
2. Coaching them for college entrance examinations.

Apparently preparation for college is better served by appropriate methods and objectives of teaching than by the type of subject matter. Results of studies of vocabulary tests indicate that prominent among factors making for success in college is the possession of an effective reading vocabulary—many words and precise meanings. Harold Bauer in his M.A. thesis at the University of Minnesota presents convincing evidence that the method of study which most definitely discriminated between achievers and nonachievers of the same mental

ability was the habit of looking up in the dictionary words not understood.

In college, except in a few such subjects as mathematics and foreign languages, the successful student is required to read not one book in a course but several or many books and in many courses much periodical literature. The high school should train its future college students in the use of books, in the search for pertinent reading material, and in the economical skimming of much material, as well as in the careful study of more essential material. It should give extensive training in outlining and taking lecture notes. It must train students to be responsible for units of work larger than the daily assignment and it should teach them effective procedures of review.

Perhaps even more important than any of these things is the responsibility of the secondary school and the student's actual and potential interest in various fields of learning. In the hectic attempts of secondary school teachers today to force young people to acquire an ephemeral relative mastery of their high school subjects, they impair the greatest asset of the youthful mind—its natural curiosity, its desire to know. It is my very firm conviction that it is far better that a bright youth never attend secondary school than to leave gorged with subject matter facts and skills but with no appetite for more, presenting himself at college only for social or vocational purposes but either completely devoid of any interest to learn more or actually conditioned to make no more intellectual effort than is necessary to obtain the marks necessary for his purposes.

In most subjects the college instructor can overcome the lack of much training in mathematics, in science, or in foreign language, but the task of overcoming an attitude of indifference and opposition to the studies we teach is discouraging. If, as many think, the quality of work of college students today is poorer than it was a quarter or a half century ago, do not be too quick to place all the blame upon such scapegoats as the decreased ability of the college student of today or the lessened mastery of the high school graduates of elementary

or secondary school subjects. The facts, where carefully gathered, do not support such conclusions. Neither should it be attributed in too large a measure to poorer college teaching nor to the development of collegiate extracurricular activities.

A much more likely factor is the use of methods of compulsion and the keyed-up drive of secondary school teachers to race their pupils through an ever expanding curriculum with sufficient superficial mastery to pass written examinations. This method of compulsion by teachers is intensified by misguided efforts at measuring the efficiency of teachers and of schools by the test scores of their pupils. In the minds of pupils goaded by intensified appeals to all sorts of primitive motives—fear, rivalry, and vanity—and directed in detail in their studies, the chances for developing curiosity and interest in the field of thought and activity are much less than for developing resentment and negative tendencies.

Another problem of the secondary school is the better articulation of its curriculum with that of the college. Two obvious maladjustments may be mentioned. The first of these is the overlapping and indefensible duplication in the fields of literature, American history, physics, and chemistry. Leonard Koos of the University of Chicago organized most splendidly a dozen years ago a convincing array of detailed facts concerning the extent to which selections in literature, facts in American history, and content and experiments in science taught in the upper two years of high school were retaught in the first two years of college.

Speaking from the point of view of the college, I may say that I had little hope then that the colleges would make the needed readjustment. Traditionally, the college has insisted that the major share of any needed readjustment should be made in the lower schools. The hopes of those who were so sure that the new institution, the junior college, would work out the articulation have not been realized. The junior college, with notable exceptions, has turned its back upon its exceptional opportunities to make epochal contributions to needed

curriculum reorganization in the area of grades 11 through 14. It has attempted to cloak itself with respectability by aping the curriculum practices of the first two years of the college. It should be conceded, however, that it was furnished an excellent alibi by the provincial and autocratic practice of college and university authorities who refused to grant credits to transfer students who had been taught in courses which were not fairly faithful imitations of those taught in their own institutions. This practice reminds one of the practice of a generation or so ago among superintendents of schools who, in order to encourage the impression that their own particular schools were superior to those in other cities, automatically assigned transferring pupils to a grade lower than that in which they had been in the school from which they came.

Fortunately, there may be noted certain tendencies in the secondary schools which will ameliorate these conditions as they have existed. One of these is the increasing number of secondary schools which are leaving to the college those units of literature which make such great demands upon maturity and appreciative powers as to limit their probable appeal to more than a minority of young people of high school age. Another is the tendency to give relatively less attention to the chronology of American political and military facts and more to the present-day social, political problems and affairs.

A third trend towards better articulation is yet in its incipiency, though textbooks which will facilitate it have begun to make their appearance. This trend may be seen in the revisions of high school courses in physics and chemistry. Leaving to the college the more theoretical, difficult, mathematical science, the secondary school course has been made over into a study of relationship of scientific principles and phenomena to home, industry, agriculture, medicine, health, and machines. The aim is not a thorough mastery of technical fundamentals as may be gotten in college, but a better chance of appreciating and understanding, at least in a general way, the natural and mechanical environment in which the ordinary man and woman will live. This type of course is likely to go far in

preserving and increasing the natural curiosity of young people in science and in the scientific aspects of life.

Still another tendency towards better articulation is the rapidly spreading conviction that all interests would be better served if college preparatory algebra and geometry were postponed to the upper two or three years of the secondary school. Not only would this result in better learning of mathematics and save teachers the strain of attempting to develop mastery of those subjects on the part of relatively heterogeneous and immature youngsters, but there would be more continuity between secondary school mathematics and the college subjects in which they were needed.

Another problem of the secondary school which invited interest and encouragement from the college is its guidance program. One of the more important and appealing areas for guidance activities involves directly the secondary school relationship. The secondary school has at once an opportunity and a responsibility for enabling high school students to arrive as intelligently as possible at the decision whether or not to attend college, what college or type of college to attend, and what curriculum to follow. Boys and girls as prospective college students have been and are today exploited mercilessly by alumni, often including their own parents, by recruiting offices of colleges, by their high school teachers, and their older brothers and sisters—actuated either by loyalty to dear old Rutgers or by whatever motivates reasonably intelligent people to tell young people what is good for them, even though what they tell arises from roots of ignorance and bias.

One variety of bad advice and pseudo-science is the attempt to answer the question whether a given child should go to college when the real question more often is: if he should go to college, what college should he attend? Through the data made available by the use of the college testing program of the American Council on Education, it is perfectly obvious that there are wide differences between the average mental ability of like student bodies of different colleges. A student on the border line of success in Haverford College, for ex-

ample, could, with the same application, rank in the upper half of a number of other colleges. Facts of this sort should be made available to counselors of prospective high school students and students should be guided into colleges appropriate to the ability of the student. We should also be thankful that there are colleges courageous enough to undertake the education of young men and women of lesser ability, leaving to others the task of educating those more capable.

In our investigations of the factors related to success in the twelve schools and colleges which go to make up the University of Minnesota, marked differences could be noted in the ability apparently necessary for success in the various curricula. It is quite clear, for example, that general mental ability a little short of that necessary in the Medical School is sufficient for reasonable success in the College of Dentistry or in the School of Pharmacy. Women of doubtful chances in the College of Education might do fairly well in the School of Nursing. Men of doubtful success in the School of Chemistry might well hope for average marks in the College of Agriculture. A student with sufficient ability to warrant encouragement to attend the College of Business Administration might well give serious thought before attempting the work in the School of Law. All these things are probably as they ought to be, but those attempting guidance more often than not fail to realize these facts.

Another problem in guidance lies in the apparently irresistible temptation for the more recently converted apostles of objective tests to exploit their less well-informed educational colleagues, as well as high school pupils, by encouraging the belief that questions of educational and vocational guidance can be answered fairly accurately when, and only when, those to be guided have taken standard achievement tests. With no convincing objective evidence of the validity of their claims, promoters of testing programs have with some success carried on extensive campaigns to develop a market for tests in which they were interested, insisting all along that it was all in the interests of guidance of prospective college students.

Like most all other great pioneers of epochal contributions to knowledge or religion, Thorndike, Terman, and others who were the major prophets of the modern testing movement must be aghast at the excesses of the later generation of test evangelists.

As a part of the program, these test enthusiasts have spread the insupportable hypothesis that test scores indicate much more accurately the possibilities of an individual for college work than do high school marks, citing as conclusive evidence the studies of Starch and Elliott in 1912 which showed that teachers will vary widely in the marks assigned a single examination paper of the subjective type. They fail to realize that the marking practices of secondary schools have improved considerably in recent years. The new concepts and the many discussions of marking as well as the improvement of practices in test construction have, without doubt, improved the marking of students in the secondary schools. There is still room for improvement. In a study upon which we are still engaged we found a coefficient of correlation of .638 between the marks of 1,178 graduates of eight Minneapolis high schools and their first year marks in the College of Science, Literature, and the Arts, of the University of Minnesota, and a similar coefficient of .71 for 402 graduates of six St. Paul high schools. Especially important are these facts: not only has no testing program ever been shown to be able to furnish data so accurately predictive of college success, but if the high school averages of these youngsters are multiplied by constants assigned to each of the schools to render the marks of the various schools more comparable to each other, the resulting coefficients are markedly higher, being .673 for the Minneapolis schools and .767 for the St. Paul schools. We may conclude that high school marks are not only most useful in guidance concerning going to college, but that they may easily be made much more so.

The secondary school has many problems. Its "feet are always wet." Many of them concern us of the college and university. One may not characterize or delineate these prob-

lems, much less offer solutions "from the point of view of the college," if, for no other reason, because the college has many points of view—I am afraid not only as many as there are colleges, but almost as many as there are professors, deans, and presidents.

One point of view, however, is fairly common. We all are interested in how the secondary school approaches or solves these problems. So many of us are so sure we have the answers, and we would much prefer to speculate on the problems of the secondary schools than to address ourselves to anything beyond the speculative stage concerning the problems incident to our own needed adjustments. One encouraging attitude of the college I can cite you—the slowly but certainly increasing tendency for the college to keep its hands off—to give the secondary school a free hand in meeting its obligations. I hope that secondary school people will be prompt to utilize that freedom.

Neglected Areas of Curriculum Implementation

By FLOYDE E. BROOKER

I

IT IS to be doubted whether educators are trying to do anything that is not already being promoted to some degree by some institution. Indeed, the task of the educator is not so much that of creating educational objectives as that of selecting from the value system of his society those objectives which the school is peculiarly able to serve.

All educational objectives listed by our institutions of learning are being furthered to some degree by the public press, the theatre, the radio, and the motion picture. These institutions exist only because they satisfy definite human needs. Recently educators have discovered "human needs," and are now beginning to develop curricula around these needs. This can be genuinely significant only when it is accompanied by a genuine appreciation of the fact that these needs existed before their discovery by educators and that, to some extent at least, they have been satisfied by institutions other than the schools.

Therefore, there is a degree of desirable competition of the school with other institutions that are serving the needs of the general populace. A complete record of these institutions would include art galleries, symphony concerts, church services, fairs, travel, lodge meetings, radio programs, magazines, public forums, newsreels, feature films, etc. For the purposes of this discussion, the field will be limited to the radio and motion picture, since these are almost unique as media of communication.

To a surprising degree the radio and the motion picture are serving the same objectives cherished by educators. Does

any educational course in any institution of learning do more to encourage racial tolerance and understanding than the radio program, "Americans All—Immigrants All"? Has any course in any school provided a better discussion of home and family relationships than the commercial radio program, "One Man's Family"? Has any course in American history done more effective work in dramatizing episodes of our past than has the "Cavalcade of America" or the series entitled "The Epic of America?" Has any course in sociology raised questions more profound than those underlying the motion picture, "Angels with Dirty Faces"? Has any classroom lecture presented more effectively two conflicting philosophies of life than the film, "You Can't Take It with You"? Has any classroom lecture presented so vividly the problems and difficulties of marriage as does the motion picture, "Made for Each Other"?

The objectives which these programs now serve differ in degree of attainment but not in kind from the objectives which the educators are committed to furthering. Radio and motion pictures are living forces, contemporary aspects of our culture, presented democratically to the public at large as a part of their everyday experience. As a matter of record it must be granted that the examples cited are not perfect tools of instruction and that they are carefully selected from the total repertoire of motion pictures and radio. The argument here is that these products are serving the same purposes and are meeting the same needs as the schools themselves, and that the schools may well profit by their example.

II

Educators must constantly ask themselves two questions: first, for the attainment of educational objectives what experiences are desirable for children of varying ages and backgrounds; and, second, how can these experiences be made concrete, vivid, and accurate as they are presented in the classroom and as the child "experiences" them?

The schools today in assuming responsibility for all aspects of the child's development, and in assuming that responsi-

bility for an increasingly large proportion of the population, face the largest task they have ever undertaken. As one writer has phrased it,

> The major functions of formal education are found to pertain to the ego or integrative needs. These needs demand for the individual a rich experience of all the aspects of reality with which he must deal, assistance in symbolozing these experiences so that relationships and generalizations can be understood, and, finally, the organization of the mental outcomes of experience into a unified well-knit personality woven about and tied together by a set of fundamental life values. The functions of education are to provide these necessary experiences and to give the necessary assistance in the organization of knowledge.[1]

One of the salient failures of our educational system arises from the fact that from the first grade through our universities "verbal symbols are substituted for sensation, perception, observation, and activity with regard to life's events."[2] It is an open question whether the newer philosophy of education can ever achieve its most effective application as long as this condition exists. And as long as it does exist whole portions of our educational objectives cannot be achieved, nor can our new curricula ever be made to work. It is questionable whether words and the academic traditions of verbalism can ever achieve the development of attitudes, ideals, loyalties, and skills in the sense of the new philosophy, and so long as the verbal tradition persists these areas of the curricula will not be implemented.

Our institutions of higher learning, and particularly the experimental colleges developed to further a general education, are especially guilty of this weakness of verbalism. Because they are avowedly making provision to give the students a more functional curriculum in terms of the basic areas of experience, and because they are dealing with students who do not represent the upper percentiles of our intellectual heavyweights, the problem is peculiarly acute. Yet in a class in the

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[1] Daniel A. Prescott, *Emotion and the Educative Process* (Washington: American Council on Education, 1938), pp. 217-18.

[2] *Ibid.*, p. 218.

social-civic area the instructors hope by one lecture on the developmental life history of a normal person, one lecture on racial problems, one lecture on civil liberties, and two lectures on juvenile delinquency to give them an adequate and functional orientation in these functions of this core area of experience. This with a class of two hundred students, with a very limited background of experience, and with serious reading difficulties.

The weaknesses given here are well understood by the college administrators and they do not exist because of any ignorance or desire on their part. The task given the school system of developing all the aspects of personality through experience is a difficult one. One of the greatest difficulties in developing an experiential curriculum increases, the higher one proceeds in the educational system. In the lower grades when the children are studying the community in order to understand the relationships that exist between themselves and the community, it is comparatively simple to provide the necessary experiences by having the children visit the grocery store, the post office, etc. But what experience can be provided college students that will enable them to understand the basic principles involved in the CIO-AFL controversy, or will provide them with the generalizations and concepts necessary for a functional orientation in the home-life area of experience? An experiential curriculum becomes increasingly difficult to develop the further one proceeds beyond the "here and now." This is probably one important reason why the higher one proceeds in the educational system the greater the reliance is on lectures, readings, reports, and tests.

III

It is the purpose of this discussion to suggest that the motion picture and the radio offer a means through these difficulties, and that the school people must give the same serious consideration to the implementation of the new curricula that they have already given to the development of the objectives of those curricula.

In terms of the society in which they work, the task of educators is not that of doing things that are apart from that society, but rather their task—once they have selected the aims they wished served—is to do what the society is already doing but more effectively. In this they are guilty of the same lag they have so often termed "cultural lag" which means that society does not move ahead on all fronts with equal rapidity. The effectiveness of the motion picture and the radio as media of communication has been well demonstrated in the culture at large. The influence of these same media in the development of attitudes, appreciations, and loyalties is well known. The effectiveness of these media in securing changes of behavior is attested by the millions spent by advertisers to control them. These media have been developed by forces within the culture to serve interests that are sometimes quite narrow.

Radio and motion pictures offer to the educator media of communication that resemble language to the degree that all media of communication deal with symbols, but that differ quite basically from language in the sense that they present, in pictures, in sound, or in combination, portions of reality and enlist the interpretation of the student in re-creating the whole. The background of experience necessary to give meaning to communication by radio or motion pictures is not as great as that required in words because the material world in each culture resembles the material world of other cultures more closely than does the philosophy and religion which explain the differences that are discernible among them. This quality of these media permits the formulation by the student of generalizations and concepts more easily and more effectively than is permitted by language, which so often starts with the generalization and then cites experience as illustrative matter. The radio presents experience wholly in terms of sound; the motion picture in terms of sound, color, and picture, or combination of these. These media through the construction of their presentation and skillful use can be made to present a "slice of experience" that is as close to the actual

experience as we can attain short of actual participation in the experience itself.

In terms of the educational objectives that school people wish to achieve, we may well consider the potential advantages of the classroom use of radio and motion pictures. In this phase of our discussion we are concerned with these media only as means of communication, as instruments of instruction. The objectives that these media may serve in instruction through the student production of films and radio programs, or through the appreciation of the offerings as portions of our culture, are concerns for another discussion.

A consideration of the radio should include both programs received through direct reception, and programs presented by means of transcriptions. The radio is of value in all instructional activities that call for a mastery of sound in terms of time and space. If it is desirable to present the first inaugural address of President Roosevelt, with the intonations and inflections that he gave that utterance, then a record made of the broadcast of that speech will give it. If an educational objective may be served by making the Czechoslovakian crisis live again, then the speeches made by Hitler, by Chamberlain, and by various commentators are available just as they were originally delivered with all the surcharging of emotions and strain that accompanied their delivery. The coronation of a king or the coronation of a pope, with on-the-ground descriptions and with the speeches made by the leading characters, can be made to live again in sound through the use of radio transcriptions. The use of direct reception makes possible a blurring of the lines separating school and society, brings contemporary history into the classroom, and makes the world of affairs an experiencing that is as real and genuine as it can be made short of actual participation.

Motion pictures because of their command of color, pictures, and sound, offer a potentially wider range of usefulness in serving educational objectives. In their mechanical and general aspects the motion picture offers three advantages: the mastery of time and space, the indication of patterns of

intelligibility, and the realistic quality of their recording and presentation of experience.

Motion pictures offer all the advantages that accrue to the expansion of the scope of visual and auditory experience through providing contacts that are wholly or very largely unavailable otherwise. The medium permits the presentation of visual and auditory materials that are remote in time. Natural and human history can be reconstructed and made to live again. At the present time most of the film material available on historical subjects consists of dramatized reconstructions of such historic episodes as the signing of the Declaration of Independence, the events that surrounded the formulation of the Constitution, or the trek of the pioneers across the western plains. However, the cameras of the world are already making a pictorial record of contemporary events. We may expect this library of film materials to increase constantly, and we may expect the educational advantages accruing from this type of record to enhance with the passage of years. One can foresee a different kind of history being taught when films will be available presenting the personalities and the speeches made at the historic episodes being studied. Already motion pictures of some of the leaders of the World War are serving to keep their memories alive in a different fashion than might be otherwise if they depended upon verbal legends alone.

The motion picture also makes possible the presentation of visual and auditory materials that are remote in space. Some kind of camera records of most of the foreign peoples of the world are already available. The ceremonial dances of the Fiji Islanders, the lion dance of the Watussi tribe of Africa, the ritual of the priests in Borneo, the dance of the Gauchos in Argentina have been recorded and are available. The day-by-day lives of people living in the Sahara, in Tibet, on the great rivers of China, on the plains of Thessaly and the steppes of Russia, and in the cities of Europe can be viewed by any student. Byrd's explorations of the Antarctic, including the flight across the South Pole, Ellsworth's trip across the North Pole, the most recent eruption of Krakatao, and the

stratosphere have all provided subjects for camera records and are available. He who sits may see.

Another feature of the camera's mastery of time and space is its mechanical ability to record phenomena which lie beyond the ken of our senses. Activities that take place within or between organisms too small, too large, too slow, or too fast for the human eye to discern can be enlarged, reduced, speeded up, or slowed down until the human eye is able to perceive them. The life processes of unicellular animals, the splitting and multiplication of cells, have been photographed through high-powered microscopes. The action of the corona, the passage of the shadow of the earth across the moon during an eclipse have been recorded through the lenses of the world's most powerful telescopes. The gradual movements of the unfolding of the petals of a blooming rose, the movements of the tiny roots of a bean plant as the plant grows have been caught by time-lapse photography so that one can see in five minutes, action which required a week. The wings of a humming bird in flight, the flow of the red blood cells through the capillaries has been slowed down until each individual movement is portrayed.

A second potential advantage of the motion picture is its ability to indicate relationships and patterns of intelligibility running through visual phenomena in a way that it can be grasped and understood by the students for which it was intended. A jade Buddha has one meaning inside a glass case in an American museum; it has quite a different meaning when viewed as part of a wayside shrine in China. The relationships and the meanings of that statuette for the people who created it are the important things to be learned through a study of it. These are the things that are lost when the idol is lifted out of its cultural setting, but these can be preserved in a motion picture. The very construction of a film, the order in which scene follows scene, offers a possibility of manipulation that will permit in the most simple fashion possible the development in the beholder of the generalizations intended. If the educational objective is to instil a sense of man's de-

pendence on his physical environment and to demonstrate how that environment shapes his existence, then the motion picture can be so constructed. Such a picture might present the following: the mud huts of Medenine, built one on top of the other against the rocky cliffs of the mountains, the process of construction, with views of the native bride carrying the water she uses to mix with the soil to make the sun-dried brick and the addition of the straw gleaned from near-by fields, the crude transportation system and the paucity of contact with the outside world could be depicted in the order indicated. Other sequences might show the construction of an Eskimo igloo by similar steps and still additional illustrations provided until the pattern of relationships would be clear by inference. Nor would these relationships be lifted out of their cultural context. There would be diminishing emphasis on the food, clothing, and sports of these people, but they would be present in the total portrayal.

Other patterns of relationships become clear only when the subject studied is presented in motion. No other medium of communication can ever portray the dynamic quality of human relationships in alien cultures so clearly and so easily as the motion picture. Scenes of the street life of Calcutta will provide material for the instructor wishing to develop an understanding of the relationship that exists between the material manifestations of art and the culture in which they appear. The same street scenes offer material for the social psychologist, the student of economic organizations, and for those interested in comparative religions.

This ability to render patterns of intelligibility clear is enhanced by the use of animated maps, models, and diagrams. These in turn may be combined with actual scenes and supplemented with a verbal commentary or with the sound that is native to the scenes portrayed. In any case the pattern needed for an adequate understanding would be seen, and seen as a dynamic process suggestive of the forces operating in that society.

A third potential of the motion picture is its dramatic pre-

sentation of subject matter in a manner simulating the conditions of direct experience—in a manner which captures the human interest, the emotional flavoring and drama of concrete living reality. The three advantages discussed here might be restated as the unique advantages of the sound film in contributing to sensory, intellectual, and emotional experience. In many cases the three will be organically interwoven, the logical isolation of each type of treatment may make for clarity. In no sense are these potential contributions of the motion picture to be considered as discrete ones. In every film presentation they are present in varying degrees. An illustration of this third advantage is found in the film, "Servant of the People." Here the formation of the Constitution is seen as a response to a need generated by living forces, as the work of men whose interests and motives were guided by that concrete situation, and who, in their prejudices and antagonisms, revealed themselves as quite human individuals whose actions were understandable in terms of the same motives which activate men today. Another illustration is provided by the March of Time release (now available to the schools) entitled, "The Workers' Alliance." The problem of federal relief, of balancing the budget, and the government's responsibility is presented not as abstract generalizations, but in a social context depicting what these things mean in terms of human lives. The problem is a tremendous one, it is still unsolved, and the film closes with a view of a parade of the Workers' Alliance, an organization of people on relief, who desire the continuance of relief at all costs.

This summary of the potential advantages of radio and motion pictures is incomplete. Nothing has been said of the uses that the schools might make of facsimile broadcasting, a service which enables the average citizen with a properly equipped radio to pull out of his machine in the morning a printed statement of the news broadcasts made while the radio was not in use. Nothing has been said of television. Television is not commercially available as yet, but if the schools wait until it is available before they begin to consider

its implications for education, the lag of the educators will be greater than it is now.

IV

The school people have not been entirely stationary in their utilization of these new ways of implementing the curriculum. Some have been enthusiastic, and have forged ahead placing people in charge of their development and persuading their colleagues of the advantages. Others have been interested and lose no opportunity to gain new insight. Others have done neither of these, they have not been in schools or colleges where these instruments were available, or they have experienced difficulty in securing and using them.

There are many handicaps in the path of any administrator who sincerely sets out to improve the instruction in his institution through the use of these instruments.

First, there is the lack of understanding of the role that motion pictures and radio may be made to play in the classroom. They are new media of communication, and their logic and grammar are only imperfectly understood. College instructors have learned to think verbally and it is difficult for them to think pictorially. Every professor of history would know how to present the Monroe Doctrine to a class in terms of generalized principles, but few professors could give you a list of motion picture scenes that would explain to the student the same doctrine.

Another aspect of this first handicap is that motion picture presentations must be considered as "experiences," and few teachers have the training or the experience to handle them on this basis. A motion picture or radio presentation has meaning for a class only to the degree that it has well understood relationships with the experiences that precede and follow it. It is doubtful whether either of these types of experience have any educational value *per se,* or whether any one can justify their use unless they are an integral portion of the planned instruction of the class with which they are used. This, along with the whole concept of a curriculum

based on experience, implies an ability on the part of the teachers to be so familiar with the educational objectives that they can select each experience in terms of the objectives they are most likely to further. Teachers have not yet been trained in this type of thinking. English teachers have always taught Shakespeare, and to continue the teaching of Shakespeare needs no defense or understanding of the educational principles to be attained through that instruction. So long as instructors trod beaten academic paths, educational objectives involved need not be considered. In the case of films, and experience, the case is quite different. Here the effective presentation in the classroom requires a detailed understanding of the educational objectives to be advanced and the development of the presentation in the fashion most likely to lead to the maximum effectiveness. Motion pictures and radio have already been developed in the tradition of entertainment and the student approaches it with a somewhat escapist attitude. Only a thorough understanding by the teacher of the educational objectives to be served will enable her to secure the maximum effectiveness of these instruments.

A second handicap follows from the first. Too many advanced and progressive educators have considered that the establishment of a service department for the administration of visual and auditory aids was sufficient to secure their proper use and development. In the older tradition of faculty psychology these were called Visual Education Departments. All too often they became clearing houses of films and equipment. Usually they did not consider their instruments in terms of the educational objectives to be advanced. Usually they confused mere use with the effective use of films, and assumed that if a great many films were being used that was sign enough of the effectiveness of their work. An indication of this confusion may be seen through an analysis of one aspect of their work. One of the greatest needs in the field today is adequate and accurate advance information relative to the content of films and their probable usefulness in specific curricular areas. So far as a national survey has been

able to ascertain, none of these departments have kept sufficient record of the films they have cleared to enable any instructor today to profit from the experience of any other instructor who has used a given film in a previous year. An instructor who wishes a film today on Japan must start from scratch, at the same place as his predecessor of five years previous.

Perhaps the greatest need in the whole field of curriculum implementation is more serious consideration of all the teaching tools, of which the motion picture and radio are but two, and the contributions each have to offer in serving particular educational objectives. This will mean that the teacher will be trained in the application of objectives, she will understand the peculiar advantages of lecture, excursion, motion picture, radio, newspaper, museum, demonstration, etc.; she will choose her methods of instruction in terms of the objectives she wishes to achieve and she will be interested in ascertaining the degree to which her objectives have been achieved.

V

Strides are being made in this direction already by educational organizations and institutions. These activities have had the support of foundations and promise to provide the school administrator and instructor with a better guide to curriculum implementation than has been hitherto available.

The Motion Picture Project of the American Council on Education under the direction of Charles F. Hoban, Jr., is well advanced in its three-year program. Four demonstration centers have been established: The General College, University of Minnesota; Santa Barbara City Schools, Santa Barbara, California; Tower Hill School, Wilmington, Delaware; and the Denver Public Schools, Denver, Colorado. At the first three of these, teachers are using motion pictures wherever they seem to fit into the classroom work, and whenever they are available. As they use the motion picture in their instruction, they are making careful and detailed records of the educational objectives which they expected the film to

serve, of the student behaviors which lead them to believe that these objectives were or were not served, and of the classroom preparation which preceded the film use. From this work it is expected that within the next two years there will be issued a catalogue which will contain an accurate and complete statement of the content of the film, an appraisal of its quality and educational usefulness, with an estimate of the grade levels and educational objectives which it might be expected to promote most effectively. A second outcome of this work is expected to be a series of reports of the ways in which, and educational objectives for which, motion pictures have been used successfully and effectively. A third outcome should be a concrete statement of the areas in which new films are most needed, and the types of films that are most desired by teachers.

The demonstration center at the Denver Public Schools is embarked on a different aspect of the educational use of motion pictures. There, five different high schools are working on the production of five student produced films. These films will deal with problems that are of local concern, such as housing, getting a job, the source and distribution of the Denver food supply, the work of the local health agencies, and ways in which young people in Denver may have a good time. It is anticipated that student production of films of this nature will further many worthwhile educational objectives.

There are many other organizations interested and active in the field, organizations whose services are available to educators interested in canvassing some of the possibilities outlined in this discussion. The Association of School Film Libraries has made available to the schools many of the most significant of the March of Time issues. The Visual Education Service of the University of Minnesota is undertaking the production of twelve documentary films dealing with phases of the history and development of Minnesota. A recent survey made by a committee of the National Council of Teachers of English discloses that some three hundred high schools have already produced motion pictures intended

to serve educational objectives. The United States government is coordinating its film activities somewhat under the head of the United States Film Service. The Department of Agriculture has recently embarked on the production of a series of educational films of considerable merit. The American Film Center in New York City has been organized to assist in the production of more effective educational films.

VI

School people face a new and tremendous responsibility in developing future citizens. The educational objectives which they are committed to attain are broader than educators have ever assumed. The character of these objectives is such that the traditional methods of lectures, readings, and reports are unlikely to achieve them effectively. Motion pictures and radio are new media of communication which have proved effective in promoting similar objectives in the culture at large. A new consideration of them and their potential educational role is suggested as a means whereby the new curricula may be implemented more effectively.

World Intellectual Organization

By ROBERT C. BINKLEY

THERE is an issue that confronts all teachers, all serious men of letters, all scientists, who take seriously their share as human beings, infinitesimal though it be, in determining the fate and future of the world. The issue has confronted the American National Committee on Intellectual Cooperation and the Social Science Research Council for years. As the Phi Beta Kappa Society launches its drive for the defense of the humanities and of academic freedom, it comes forward again. The issue has to do with the relation of the world's intellectual organization to its organization of wealth and power.

Shall those who are within the world's intellectual organization seek to use it to influence power policies—as in passing resolutions at meetings of learned societies against acts of foreign states—and risk thereby the weakening of the international fabric of intellectual organization? Shall the students of economic phenomena become sponsors of a practical program for which they would have such responsibility that their science itself may be turned out of office? Recently a renowned physicist made public his decision to bar from his laboratory all visitors from the totalitarian states and to refrain from discussing his experiments with citizens of those states.

To make this issue clear, let us assume that there is in the world a body of specific institutions within which intellectual cooperation takes place. These institutions include everything from education and research to entertainment and publishing. They constitute, in a sense, a world of their own. It is with these institutions that the League of Nations' Institute of International Intellectual Cooperation, the Social Science Research Council, and the Phi Beta Kappa Society are concerned. As a world of intellectual institutions, they are at

once distinguished from and related to two other worlds—the worlds of power, and of debts and markets.

The world of power—the political world—has been studied as a whole. Its processes have been examined; its history and its physiology are analyzed in whole libraries of books, descriptive and analytical. The same can be said of the economic world. However, most of our descriptive and analytical study of the intellectual world has been devoted to the product rather than the process. Our scholarly literature, critical and historical, is in the main a travel literature. We have indeed collected much information about the functioning of different parts of intellectual organization. In the field of education, for instance, and perhaps in the functioning of the press, a great amount of information has been collected. But we do not have, even in outline, a conspectus of the organization as a whole.

We have at hand the cumulated results of the thinking of many generations in analyzing the economic and political worlds. We know something of the quantities that are involved; we can estimate resources and armaments; we have statistics on credits and business activity. We do not all agree in the analysis of the dynamics of these worlds, but at least we are accustomed to looking at them as wholes. But we have no corresponding vision of the world of intellectual cooperation.

Yet intellectual organization is the house in which we live. We have lived in it so long that we think we can take it for granted. We have looked from its windows and described the other houses; we know that some alterations have recently been made. But we lack even a floor plan of the building as a whole.

We are aware of great and recent changes in this world of intellectual cooperation: radio, movies, literacy, censorship, propaganda, the multiplying of culture languages and of culture centers, business formations, as in radio and movies; power formations, as in the totalitarian states, have brought new situations into existence. Our primary practical concern

is with the functioning of this world of intellectual organization, with its growth or decay, its survival, and with the use we make of our place in it. It is a world not divided territorially, like the states, but into disciplines and arts, most of which are essentially international.

Let us take note of two characteristics of the intellectual world which exhibit its peculiarly international character. First, there is still in existence a world-wide acceptance of the results of experiment in the natural sciences. A scientific experiment, properly recorded in our highly institutionalized system of learned journals, not only has world currency but world authority. Its credit is better than bank credit; its authority is more definitive and universal than the authority of any judgment of a court of law. The assumption of good faith that obtains in the field of scientific work is the kind of assumption that exists only among insiders in a going concern. The power world has restricted the jurisdiction of the high courts of science, it is true. Nothing on race and anthropology can pass in Germany without the *nihil obstat* or the *praemunire*. But in general the authority of the jurisdictions of science is a world authority.

In the field of intellectual property there is a peculiar relation of public property to international organization. For the public domain in intellectual property is international domain. In publicly owned tangibles—bridges and roads, buildings and battleships—public domain concentrates in the object the qualities of sovereignty and of property. But intellectual property that is public domain becomes something from which no one is excluded. Only the open sea shares with intellectual property the character of international domain. International *action* (as in international copyright) may have the effect of diminishing international *domain*. Only in the presence of a clear picture of the functioning of this world of intellectual cooperation can its citizens make sound policy. We should have a picture of the present situation, a definition of the directions in which we would wish to see the situation change, and then a selection of the acts best calculated to accomplish the change.

Let us first consider how far this world of intellectual organization permits of measurement. It may be that the objects we seek to attain are not measurable, but they are at least related to measurable features of the intellectual world.

We must assume that there is in some way a possible distinction between American intellectual organization on the one hand, and international intellectual organization on the other. The simplest distinction, which may be taken as a first approximation, is the distinction between events occurring here and abroad. A more refined analysis may then show that some events occurring here belong rather to international than to national intellectual organization, and that some events occurring abroad belong to our own intellectual organization.

In what units can intellectual organization be measured? The simplest are men, money, product, and time. In the publishing industry we should inquire, for instance, how many people are employed in each of the kinds of writing, how much money is involved in publishing and how it is distributed, how many items are published, by how many people they are bought, by how many people they are read, and how much time is involved in the reading. We should inquire how the writers are motivated to write, and the readers to read. So far as possible we should break down these quantities into appropriate classifications.

The same units of measurement can be applied to the educational system, to the research system, to entertainment, to music, radio, moving pictures, lectures, perhaps even to travel and to mail communication, if that be adjudged a part of intellectual organization. Perhaps even commercial advertising should be accorded some gross measurement, and certainly the work of propaganda agencies should be given at least a quantitative estimate.

In so far as dollar estimates of quantity can be made, and the particular channels of the flow of money described, the relation with the economic world is clarified. In so far as the positive action of government (as in education) and its nega-

tive action (as in censorship) are defined, the relation of the intellectual world with the world of power is also defined.

With these gross measurements in hand, and they might be tabulated in huge cross-section charts, it will be possible to begin the analysis of international intellectual organization in so far as the intellectual organization of this country shares in it.

It is at this point that we could bring together the answers to such questions as these: What proportion of newspaper space is given over to foreign news; what proportion of teaching time is given over to the teaching of foreign matters, including such things as foreign literatures and international relations; what proportion of research energy is committed to these fields; in what degree are our library resources committed to foreign as against domestic materials? What proportion of our consumption of intellectual goods comes from abroad; what proportion goes abroad; etc. These are broad categories, but in the course of measurement they would be refined.

If it is possible, even as a crude estimate, to measure world intellectual activity, and set against its quantities the quantities for America, and the amount of overlap, the quantitative framework for the making of policy will be established.

A very important issue will have to be faced at this time: Is it the object to *use* the existing intellectual organization of the world to accomplish certain effects in the world of power, or to *protect* the organization and develop it as a value in itself? These two objectives may prove inconsistent with each other. Efforts to use intellectual organization as a means of influencing power policies may recoil against the organization itself, either directly, as when an effort to bring pressure to bear in Germany results in the withdrawal of Germans from international association, or indirectly, as in the case of an invitation to governments to restrain international name-calling by police power (moral disarmament), which may prove a boomerang against full freedom of the press. (Note the restraints on Dutch and Swiss press in respect to Hitler.)

If we are to function as an unofficial propaganda agency for America, our actions may be received in some quarters with the same attitude that greets communist and fascist propaganda here. Any of these policies are open to us, but we must think them through clearly.

I can only compare our situation to that of the Church when it faced the difficult problems of adjustment with the world of secular power. Intellectual organization has quietly accomplished in the course of the past century for the world as a whole an intellectual unification such as Christianity once accomplished for Western Europe. Communism and fascism may reject part, but they do not reject all, of the bases of world collaboration.

With our objective defined, and our measurements established, it will be possible to find the critical points for action. We may discover, for instance, that the study of international relations in our schools is moving forward without the need of extra pressure, but that the study of modern languages is declining and needs help. If our figures show this situation, we should concentrate on the point where help is needed. And so on throughout the whole field.

In the presence of the magnitudes that our survey would disclose, the resources of our committee must appear very small indeed. We will not spend over many years what it costs to produce one movie. If we undertake to propagate a particular idea by direct action, we must do it with resources that would not suffice to put on the market a new brand of tomato sauce, let alone a brand of cigarettes. But this consideration should not discourage us; rather it should impress us all the more with the unique importance of the situation we occupy, as the only body in America with terms of reference that fit it for general staff work in the world of intellectual organization. Of all the countries from which delegates go to Paris, is there any which is really so well situated to assume freedom from political constraint and financial limitations in intellectual activities?

At the same time, a consideration of the meagerness of our

resources should counsel us against drop-in-the-bucket activities, and against action and effort in matters where we do not see clearly the exact character of the interest we are serving. None of us really knows whether one or another of many possible new systems of international intellectual property will serve or obstruct the functioning of the system of world intellectual cooperation. Neither are we sure what operations in promoting abroad the *idée Americaine* will fulfil our desires, and what ones will kick back, like dollar diplomacy.

The 1938 Psychological Examination

By L. L. THURSTONE, THELMA GWINN THURSTONE, and DOROTHY C. ADKINS

THE 1938 edition is the fifteenth edition of the American Council on Education *Psychological Examination for College Freshmen.* This report is based on all records received by March 1, 1939. Three hundred fifty-six colleges have reported scores of 71,084 students. Nineteen of these colleges used the separate answer sheet form of the examination and reported the scores of 9,263 students. Since 1933 an annual edition of the *Psychological Examination for High School Students* has been prepared. This report contains norms for 4,541 students in thirty-seven high schools on the 1938 edition of the high school examination and equivalent scores for the 1937 and 1938 editions. The 1938 editions were the first to be arranged for machine scoring. Separate answer sheet forms were prepared for both the high school and college editions.

The norms for these tests have been tabulated in the form of percentile ranks. We have rather frequent inquiry about the translation of test scores into intelligence quotients and mental ages. Mental ages and intelligence quotients do not exist for these tests in the range of college students. Perhaps a few words of explanation should be given here. The intelligence quotient is, by definition, the ratio of the mental age to the chronological age. The mental age of a test performance is the chronological age for which the test performance is the average. It follows from this definition that mental ages and intelligence quotients are indeterminate for the upper half of the adult population. If a person scores above the average for adults in a psychological examination, then there exists no age for which his score is the average. College students can be assumed to score above the average for the

adult population of the country, and, consequently, they cannot be assigned any mental ages or intelligence quotients. This is not a debatable question. It is a question of very simple and straightforward logic.

Intelligence quotients are assigned to the upper half of the adult population by changing the definition of mental age. For example, a mental age of fifteen or eighteen does not mean the average test performance of people of that age. Such mental ages are arbitrary designations of what the test author may choose to call superior adult performance.

Test norms should be tabulated in terms of percentile ranks or of standard scores for a specified group. If norms were tabulated in this manner for all age groups, we could easily avoid the ambiguities and absurdities of mental ages and intelligence quotients for superior adults. A table of percentile ranks for each age group gives much more information than the mental age, even for young children. With such tables, the test performance of a child could be given an age assignment, if such age exists. The child could be given a percentile rank in comparison with any desired age group, or his performance might be compared directly with the test performances of different groups of subjects that represent different selective conditions.

Summary of the Tables

Table I contains an alphabetical list of all the colleges that have reported their scores.

Table II shows the rank number, the number of students, and the three quartile points for each of the colleges. They are arranged in order from the highest median score to the lowest. Since colleges are interested in their ranks, they will be informed of their code numbers. Another and perhaps better way to judge the standing of a college is to find the percentile rank of its median gross score in Table XII, in the column corresponding to its classification—four-year college, junior college, or teachers college.

Table III contains norms on gross scores for the total

group of colleges reporting. Separate columns in this table show norms for men and for women and for the separate answer sheet form of the examination.

Tables IV and V contain norms for the Q-scores (Quantitative) and L-scores (Linguistic) of the college form. Separate norms are reported for men and for women and for the separate answer sheet form.

Tables VI to XI give norms for the six separate tests in the college examination. Again separate norms are reported for men and for women and for the separate answer sheet form.

Table XII contains separate norms for three types of colleges: four-year colleges, junior colleges, and teachers colleges.

Table XIII gives equivalent scores for the 1937 college edition and for both the hand-scoring and separate answer sheet forms of the 1938 college edition.[1]

The next four tables contain norms for the 1938 high school edition.

Table XIV contains separate gross-score norms on the high school edition for grades 9, 10, 11, and 12.

Tables XV and XVI contain Q-score (Quantitative) and L-score (Linguistic) norms for the four high school grades.

Table XVII contains equivalent scores on the 1937 and 1938 editions of the high school test. These norms are reported also for each of the four grades.

Table XVIII presents correlations between scholarship and several college editions of the psychological examination.

Table XIX shows the correlations between the part-scores of the 1938 college edition.

Table XX summarizes the results of a factor analysis of the intercorrelations of the part-scores of the 1938 college edition.

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[1] An error in the preliminary report of the equivalent scores for the separate answer sheet edition has been corrected in this table.

Table I

Universities and Colleges Submitting Test Records

Adelphi College, Garden City, N. Y.
Alabama College, Montevallo, Ala.
Alabama Polytechnic Institute, Auburn, Ala.
Albany College, Portland, Ore.
Alberta Normal School, Edmonton, Alberta, Canada
Albion College, Albion, Mich.
Alderson-Broaddus College, Philippi, W. Va.
Allegheny College, Meadville, Pa.
Alliance College, Cambridge Springs, Pa.
Alma College, Alma, Mich.
Alverno Teachers College, Milwaukee, Wis.
American University, Washington, D. C.
Anderson College, Anderson, S. C.
Arkansas Polytechnic College, Russellville, Ark.
Armour Institute of Technology, Chicago, Ill.
Ashland College, Ashland, Ohio
Athens College, Athens, Ala.
Augsburg College, Minneapolis, Minn.
Babson Institute, Babson Park, Mass.
Baker University, Baldwin City, Kan.
Bakersfield Junior College, Bakersfield, Calif.
Baltimore College of Commerce, Baltimore, Md.
Barat College of the Sacred Heart, Lake Forest, Ill.
Bay City Junior College, Bay City, Mich.
Beaver College, Jenkintown, Pa.
Belhaven College, Jackson, Miss.
Blackburn College, Carlinville, Ill.
Blackstone College for Girls, Blackstone, Va.
Blue Mountain College, Blue Mountain, Miss.
Bowdoin College, Brunswick, Me.
Bradley Polytechnic Institute, Peoria, Ill.
Briar Cliff College, Sioux City, Iowa
Brooklyn College, Brooklyn, N. Y.
Brown University, Providence, R. I.
Bucknell University, Lewisburg, Pa.
Bucknell University Junior College, Wilkes-Barre, Pa.
Canisius College, Buffalo, N. Y.
Carleton College, Northfield, Minn.
Carroll College, Helena, Mont.
Carroll College, Waukesha, Wis.
Carthage College, Carthage, Ill.
Case School of Applied Science, Cleveland, Ohio
Cedar Crest College for Women, Allentown, Pa.
Centenary College, Shreveport, La.
Central College, Palla, Iowa
Central State Teachers College, Mt. Pleasant, Mich.
Central Y.M.C.A. College, Chicago, Ill.
Centre College of Kentucky, Danville, Ky.
Chanute Junior College, Chanute, Kan.
Chariton Junior College, Chariton, Iowa
Chicago Teachers College, Chicago, Ill.
Clark University, Worcester, Mass.
Clarke College, Dubuque, Iowa
Coe College, Cedar Rapids, Iowa
Colby College, Waterville, Me.
Colgate University, Hamilton, N. Y.
College Misericordia, Dallas, Pa.
College of Chestnut Hill, Philadelphia, Pa.
College of Emporia, Emporia, Kans.
College of Idaho, Caldwell, Idaho
College of Mount St. Vincent, New York, N. Y.
College of New Rochelle, New Rochelle, N. Y.
College of Notre Dame of Maryland, Baltimore, Md.
College of Puget Sound, Tacoma, Wash.
College of St. Elizabeth, Convent Station, N. J.
College of St. Francis, Joliet, Ill.
College of William and Mary, Norfolk, Va.

College of William and Mary, Richmond, Va.
College of William and Mary, Williamsburg, Va.
Colorado College, Colorado Springs, Colo.
Colorado State College of Agriculture and Mechanic Arts, Fort Collins, Colo.
Colorado State College of Education, Greeley, Colo.
Colorado Woman's College, Denver, Colo.
Concord State Teachers College, Athens, W. Va.
Concordia Collegiate Institute, Bronxville, N. Y.
Concordia Teachers College, River Forest, Ill.
Connecticut College, New London, Conn.
Cornell College, Mt. Vernon, Iowa
Creighton University, Omaha, Neb.
Davidson College, Davidson, N. C.
DePauw University, Greencastle, Ind.
Dickinson College, Carlisle, Pa.
Dodd College, Shreveport, La.
Drake University, Des Moines, Iowa
Drew University, Madison, N. J.
Drury College, Springfield, Mo.
Duchesne College, Omaha, Neb.
Duluth Junior College, Duluth, Minn.
D'Youville College, Buffalo, N. Y.
Earlham College, Richmond, Ind.
Eastern Illinois State Teachers College, Charleston, Ill.
Elmhurst College, Elmhurst, Ill.
Emory and Henry College, Emory, Va.
Emory Junior College, Oxford, Ga.
Emory Junior College, Valdosta, Ga.
Emory University, Emory University, Ga.
Erskine College, Due West, S. C.
Eureka College, Eureka, Ill.
Evansville College, Evansville, Ind.
Fenn College, Cleveland, Ohio
Ferris Institute, Big Rapids, Mich.
Florida State College for Women, Tallahassee, Fla.
Fontbonne College, St. Louis, Mo.
Fordham University, New York, N. Y.
Fort Lewis College, Hesperus, Colo.
Franklin College of Indiana, Franklin, Ind.
Franklin and Marshall College, Lancaster, Pa.
Fresno State College, Fresno, Calif.
Gallaudet College, Washington, D. C.
Geneva College, Beaver Falls, Pa.
George Pepperdine College, Los Angeles, Calif.
Georgetown University, Washington, D. C.
Georgian Court College, Lakewood, N. J.
Gettysburg College, Gettysburg, Pa.
Glenville State Teachers College, Glenville, W. Va.
Good Counsel College, White Plains, N. Y.
Goshen College, Goshen, Ind.
Graceland College, Lamoni, Iowa
Great Falls Normal College, Great Falls, Mont.
Green Mountain Junior College, Poultney, Vt.
Greenbrier Junior College, Lewisburg, W. Va.
Greensboro College, Greensboro, N. C.
Grinnell College, Grinnell, Iowa
Gunston Hall, Washington, D. C.
Gustavus Adolphus College, St. Peter, Minn.
Hanover College, Hanover, Ind.
Henderson State Teachers College, Arkadelphia, Ark.
Hendrix College, Conway, Ark.
Herzl Junior College, Chicago, Ill.
Hiram College, Hiram, Ohio
Hobart College, Geneva, N. Y.
Howard College, Birmingham, Ala.
Huntingdon College, Montgomery, Ala.
Huron College, Huron, S. D.
Hutchinson Junior College, Hutchinson, Kan.
Illinois College, Jacksonville, Ill.
Immaculata College, Immaculata, Pa.
Immaculata Junior College, Washington, D. C.
Indiana Central College, Indianapolis, Ind.
Indiana State Teachers College, Terre Haute, Ind.
Itasca Junior College, Coleraine, Minn.
James Millikin University, Decatur, Ill.

Jefferson College, St. Louis, Mo.
Jesuit Novitiate, Wernersville, Pa.
Judson College, Marion, Ala.
Junior College of Connecticut, Bridgeport, Conn.
Kalamazoo College, Kalamazoo, Mich.
Kanawha College, Charleston, W. Va.
Kansas State Teachers College, Pittsburg, Kan.
Keuka College, Keuka Park, N. Y.
Lafayette College, Easton, Pa.
Lander College, Greenwood, S. C.
LaSalle-Peru-Oglesby Junior College, LaSalle, Ill.
Lawrence College, Appleton, Wis.
Lebanon Valley College, Annville, Pa.
Le Clerc College, Belleville, Ill.
Lehigh University, Bethlehem, Pa.
Lewiston State Normal School, Lewiston, Idaho
Linden Hall, Lititz, Pa.
Louisiana State University, University, La.
Lower Columbia Junior College, Longview, Wash.
Loyola College, Baltimore, Md.
Loyola University, Chicago, Ill.
Lynchburg College, Lynchburg, Va.
Lyons Township Junior College, La Grange, Ill.
Macalester College, St. Paul, Minn.
MacMurray College, Jacksonville, Ill.
Manhattan College, New York, N. Y.
Manhattanville College of the Sacred Heart, New York, N. Y.
Mary Baldwin College, Staunton, Va.
Marygrove College, Detroit, Mich.
Maryland State Teachers College, Frostburg, Md.
Maryland State Teachers College, Towson, Md.
Marymount College, Salina, Kan.
Maryville College, St. Louis, Mo.
Marywood College, Scranton, Pa.
Massachusetts General Hospital, Boston, Mass.
Massachusetts State College, Amherst, Mass.
McKendree College, Lebanon, Ill.
McPherson College, McPherson, Kan.
Mercyhurst College, Erie, Pa.
Michigan State College, East Lansing, Mich.
Millsaps College, Jackson, Miss.
Milwaukee Vocational School, Milwaukee, Wis.
Mississippi Delta State Teachers College, Cleveland, Miss.
Missouri Valley College, Marshall, Mo.
Modesto Junior College, Modesto, Calif.
Monmouth College, Monmouth, Ill.
Montana State College, Bozeman, Mont.
Montana State Normal College, Dillon, Mont.
Montana State University, Missoula, Mont.
Moravian Seminary and College, Bethlehem, Pa.
Morningside College, Sioux City, Iowa
Morris Harvey College, Charleston, W. Va.
Morton Junior College, Cicero, Ill.
Mount St. Agnes Junior College, Baltimore, Md.
Mount St. Scholastica College, Atchison, Kan.
Muhlenberg College, Allentown, Pa.
National College of Education, Evanston, Ill.
New Haven Y.M.C.A. Junior College, New Haven, Conn.
New Jersey College for Women, New Brunswick, N. J.
New Jersey State Teachers College, Jersey City, N. J.
New Jersey State Teachers College, Montclair, N. J.
New Jersey State Teachers College, Newark, N. J.
New Jersey State Teachers College, Trenton, N. J.
New River State College, Montgomery, W. Va.
North Central College, Naperville, Ill.
North Dakota Agricultural College, Fargo, N. D.
Northern Illinois State Teachers College, De Kalb, Ill.
Northwest Nazarene College, Nampa, Idaho
Notre Dame College, South Euclid, Ohio
Notre Dame College of Staten Island, New York, N. Y.
Oberlin College, Oberlin, Ohio

Oregon Normal School, Monmouth, Ore.
Oregon State College, Corvallis, Ore.
Ottawa University, Ottawa, Kan.
Ottumwa Heights College, Ottumwa, Iowa
Pace Institute, New York, N. Y.
Pacific University, Forest Grove, Ore.
The Packer Collegiate Institute, Brooklyn, N. Y.
Park College, Parkville, Mo.
Parsons College, Fairfield, Iowa
Penn Hall Junior College and Preparatory School, Chambersburg, Pa.
Pennsylvania College for Women, Pittsburgh, Pa.
Pfeiffer Junior College, Misenheimer, N. C.
Phillips University, Enid, Okla.
Piedmont College, Demorest, Ga.
Pine Manor Junior College, Wellesley, Mass.
Port Huron Junior College, Port Huron, Mich.
Potomac State School, Keyser, W. Va.
Presbyterian College, Clinton, S. C.
Quincy College, Quincy, Ill.
Racine-Kenosha Rural Normal College, Union Grove, Wis.
Randolph-Macon Woman's College, Lynchburg, Va.
Reed College, Portland, Ore.
Regis College, Denver, Colo.
Regis College, Weston, Mass.
Rhode Island State College, Kingston, R. I.
Rollins College, Winter Park, Fla.
Rosary College, River Forest, Ill.
Rose Polytechnic College, Terre Haute, Ind.
Rosemont College, Rosemont, Pa.
Russell Sage College, Troy, N. Y.
St. Francis Xavier College for Women, Chicago, Ill.
St. Genevieve of the Pines Junior College, Asheville, N. C.
St. Helen's Hall Junior College, Portland, Ore.
St. John's College, Annapolis, Md.
St. Joseph College, West Hartford, Conn.
St. Lawrence University, Canton, N. Y.
St. Louis University, St. Louis, Mo.
St. Mary College, Leavenworth, Kan.
St. Mary of the Woods College, St. Mary-of-the-Woods, Ind.
St. Mary's College, Holy Cross, Ind.
St. Mary's Female Seminary, St. Mary's City, Md.
St. Meinrad Seminary, St. Meinrad, Ind.
St. Michael's College, Winooski Park, Vt.
St. Vincent College, Latrobe, Pa.
Salem College, Salem, W. Va.
Sam Houston State Teachers College, Huntsville, Tex.
San Francisco College for Women, San Francisco, Calif.
San Mateo Junior College, San Mateo, Calif.
Santa Rosa Junior College, Santa Rosa, Calif.
Scottsbluff Junior College, Scottsbluff, Neb.
Scranton-Keystone Junior College, La Plume, Pa.
Seattle Pacific College, Seattle, Wash.
Shenandoah College, Dayton, Va.
Shepherd State Teachers College, Sheperdstown, W. Va.
Shorter College, Rome, Ga.
Simmons College, Boston, Mass.
Simpson College, Indianola, Iowa
Sioux Falls College, Sioux Falls, S. D.
Snead Junior College, Boaz, Ala.
South Dakota State College of Agriculture and Mechanic Arts, Brookings, S. D.
South Dakota State School of Mines, Rapid City, S. D.
Southern Georgia Teachers College, Collegeboro, Ga.
Southern Methodist University, Dallas, Tex.
Southwestern, Memphis, Tenn.
Southwestern College, Winfield, Kan.
Spokane Junior College, Spokane, Wash.
Spring Hill College, Spring Hill, Ala.
Springfield College, Springfield, Mass.
Springfield Junior College, Springfield, Ill.
State College of Washington, Pullman, Wash.
State Teachers College, Duluth, Minn.
State Teachers College, Edinboro, Pa.

State Teachers College, Mankato, Minn.
State Teachers College, North Adams, Mass.
State Teachers College, Winona, Minn.
State Teachers College of the City of Boston, Boston, Mass.
Swedish Covenant Hospital, Chicago, Ill.
Sweet Briar College, Sweet Briar, Va.
Taylor University, Upland, Ind.
Trinity College, Hartford, Conn.
Trinity College, Sioux City, Iowa
Trinity College, Washington, D. C.
Tufts College, Medford, Mass.
Tusculum College, Greenville, Tenn.
Union College, Lincoln, Neb.
University of Akron, Akron, Ohio.
University of Alberta, Edmonton, Alberta, Canada
University of Buffalo, Buffalo, N. Y.
University of Chattanooga, Chattanooga, Tenn.
University of Chicago, Chicago, Ill.
University of Colorado, Boulder, Colo.
University of Delaware, Newark, Del.
University of Denver, Denver, Colo.
University of Dubuque, Dubuque, Iowa
University of Kansas City, Kansas City, Mo.
University of Louisville (Speed Scientific School), Louisville, Ky.
University of Maine, Orono, Me.
University of Michigan, Ann Arbor, Mich.
University of New Hampshire, Durham, N. H.
University of New Mexico, Albuquerque, N. M.
University of North Carolina, Chapel Hill, N. C.
University of Pittsburgh, Pittsburgh, Pa.
University of Redlands, Redlands, Calif.
University of Scranton, Scranton, Pa.
University of Vermont, Burlington, Vt.
University of Western Ontario, London, Ontario, Canada
University Preparatory School and Junior College, Tonkawa, Okla.
Urbana Junior College, Urbana, Ohio
Ursinus College, Collegeville, Pa.
Ursuline College, New Orleans, La.
Valparaiso University, Valparaiso, Ind.
Vanderbilt University, Nashville, Tenn.
Waldorf College, Forest City, Iowa
Washburn College, Topeka, Kan.
Washington College, Chestertown, Md.
Washington and Jefferson College, Washington, Pa.
Washington and Lee University, Lexington, Va.
Waterloo College, Waterloo, Ontario, Canada
Wayne University, Detroit, Mich.
Webster College, Webster Groves, Mo.
Wells College, Aurora, N. Y.
West Virginia Wesleyan College, Buckhannon, W. Va.
Westbrook Junior College, Portland, Me.
Western College, Oxford, Ohio
Western Maryland College, Westminster, Md.
Western Reserve University, Cleveland, Ohio
Western Washington College of Education, Bellingham, Wash.
Westfield State Teachers College, Westfield, Mass.
Westminster College, Fulton, Mo.
Westminster College, New Wilmington, Pa.
Willamette University, Salem, Ore.
William Smith College, Geneva, N. Y.
Williamsport Dickinson Seminary, Williamsport, Pa.
Wilson College, Chambersburg, Pa.
Wilson Junior College, Chicago, Ill.
Wright Junior College, Chicago, Ill.
Xavier University, Cincinnati, Ohio
Yakima Valley Junior College, Yakima, Wash.
Yankton College, Yankton, S. D.
Yuba County Junior College, Marysville, Calif.

Table II

Scores of Individual Colleges and Universities by Code Number

Institution code number	*Number of students*	*Gross Scores* Q_1	Median	Q_3
1	10	109.17	120.00	137.50
2	349	105.46	118.53	132.22
3	13	102.08	115.83	128.75
4	45	100.31	115.50	125.47
5	193	100.39	114.03	126.78
6	101	104.12	113.75	127.81
7	600	98.06	113.00	127.62
8	163	102.15	112.61	123.49
9	57	104.46	112.50	128.96
10	227	95.8	112.2 *	123.7
11	303	98.53	112.13	125.06
12	165	98.83	111.80	123.69
13	403	97.46	111.04	124.89
14	93	92.03	110.31	124.13
15	169	95.77	108.28	121.17
16	205	97.88	108.01	118.94
17	230	95.50	107.86	120.15
18	1,016	96.01	107.70	119.67
19	122	93.75	107.65	119.58
20	339	96.18	107.15	118.71
21	208	92.50	106.94	125.00
22	462	91.64	106.70	119.26
23	164	92.27	106.67	120.00
24	167	89.90	106.46	123.56
25	297	90.30	106.29	124.95
26	281	94.58	106.16	119.29
27	179	90.73	106.02	118.15
28	260	94.71	105.86	118.44
29	1,611	90.7	105.8 *	119.5
30	545	91.57	105.42	117.41
31	61	76.25	104.38	121.88
32	114	91.56	104.17	123.44
33	83	88.59	104.17	121.04
34	522	88.64	103.09	117.18
35	82	93.44	103.08	113.86
36	32	85.00	103.00	120.00
37	261	87.70	102.73	119.41
38	97	90.78	102.71	124.79
39	127	89.22	102.66	116.25
40	9	85.63	102.50	109.38
41	142	89.79	102.25	116.41
42	41	83.75	102.08	117.19
43	388	85.00	102.04	115.76
44	106	89.58	102.00	117.19
45	279	89.63	101.95	116.06
46	105	90.21	101.73	117.05
47	94	88.21	101.67	119.06
48	68	81.25	101.67	113.33
49	185	84.02	100.88	114.04
50	197	87.70	100.83	115.63
51	143	87.9	100.4 *	111.8

Institution code number	*Number of students*	*Gross Scores* Q_1	*Median*	Q_3
52	194	85.57	100.24	115.15
53	264	85.79	100.00	112.50
54	88	83.33	99.50	115.00
55	194	87.03	99.29	114.56
56	115	78.6	99.2 *	115.4
57	495	83.49	99.20	115.33
58	116	86.07	99.00	112.27
59	204	87.50	98.96	111.82
60	39	84.38	98.75	116.56
61	424	81.55	98.60	115.34
62	186	82.0	98.5 *	112.1
63	57	82.25	98.50	111.25
64	239	85.72	98.37	112.29
65	24	88.33	98.33	110.00
66	220	82.33	98.20	113.16
67	83	81.70	98.13	118.25
68	75	85.75	98.12	113.25
69	263	84.46	98.07	111.46
70	117	82.08	97.88	108.98
71	932	81.42	97.85	113.22
72	439	82.22	97.76	111.18
73	219	78.37	97.64	113.89
74	165	82.63	97.64	111.98
75	19	82.19	97.50	121.25
76	68	78.13	97.50	115.00
77	135	77.97	97.29	115.94
78	366	78.38	97.22	115.31
79	417	82.6	97.2 *	112.3
80	318	83.80	97.10	112.94
81	221	82.02	96.93	110.86
82	362	81.69	96.72	114.34
83	50	77.50	96.67	118.13
84	75	84.69	96.56	111.41
85	347	78.96	96.48	110.22
86	485	82.42	96.33	109.97
87	29	75.31	96.25	109.38
88	174	77.50	96.00	112.32
89	160	76.67	95.94	109.29
90	332	79.38	95.83	113.24
91	51	77.92	95.83	110.42
92	60	81.25	95.71	110.00
93	306	80.90	95.62	112.19
94	99	79.75	95.62	107.03
95	138	83.97	95.50	107.68
96	72	83.75	95.00	103.93
97	494	79.43	94.86	109.60
98	250	74.22	94.72	109.84
99	235	80.46	94.50	111.25
100	45	74.25	94.38	103.75
101	124	80.71	94.33	110.83
102	224	77.50	94.33	109.76
103	111	79.11	94.11	113.91
104	226	76.25	93.97	106.31
105	236	77.25	93.95	108.21
106	63	72.29	93.93	110.31
107	79	82.08	93.93	110.21
108	162	78.9	93.9 *	103.8
109	174	82.12	93.68	107.17

Institution code number	*Number of students*	*Gross Scores* Q_1	*Median*	Q_3
110	98	80.31	93.64	106.50
111	128	79.00	93.64	106.15
112	198	74.79	93.61	110.75
113	18	85.83	93.33	116.25
114	66	78.75	93.33	112.19
115	190	73.54	93.33	111.88
116	190	77.12	93.33	108.68
117	90	75.63	93.33	108.21
118	256	77.08	93.10	107.78
119	147	72.16	93.04	108.54
120	172	74.29	93.00	110.45
121	45	75.42	92.92	113.96
122	110	72.75	92.92	107.50
123	201	76.25	92.83	108.07
124	775	75.9	92.8 *	110.0
125	315	77.45	92.80	107.46
126	132	79.00	92.78	107.50
127	109	75.13	92.50	109.75
128	225	75.35	92.50	108.19
129	163	74.13	92.50	107.12
130	112	74.38	92.50	104.71
131	203	78.62	92.38	106.08
132	199	79.25	92.36	107.60
133	268	75.50	92.25	107.29
134	445	75.98	92.24	103.71
135	396	79.00	92.05	105.62
136	167	77.21	91.96	103.32
137	220	76.25	91.82	108.53
138	129	76.88	91.75	106.46
139	228	75.25	91.67	111.00
140	204	72.86	91.67	105.62
141	200	70.00	91.67	104.38
142	136	73.33	91.54	115.00
143	97	75.3	91.5 *	102.7
144	174	76.94	91.36	108.06
145	24	77.50	91.25	107.50
146	106	76.25	91.25	105.83
147	46	77.50	90.83	102.50
148	107	75.54	90.75	107.81
149	124	72.92	90.50	105.00
150	86	71.88	90.50	104.17
151	79	70.75	90.42	110.31
152	59	73.96	90.42	105.89
153	63	74.38	90.28	104.06
154	95	72.68	90.25	104.03
155	226	75.87	90.24	103.29
156	397	74.38	90.18	103.46
157	163	66.38	90.16	103.66
158	1,048	74.73	90.12	105.16
159	77	79.50	90.00	101.00
160	199	76.58	89.86	105.86
161	154	75.21	89.72	105.19
162	323	74.20	89.55	105.68
163	146	68.41	89.55	103.39
164	51	75.75	89.50	107.71
165	298	74.25	89.40	104.43
166	59	77.19	89.38	104.46
167	217	72.08	89.32	102.92
168	1,753	73.4	89.2 *	103.1

Institution code number	*Number of students*	*Gross Scores* Q_1	*Median*	Q_3
169	75	59.75	89.17	108.25
170	145	73.91	89.17	106.38
171	135	71.70	89.17	103.66
172	102	70.31	89.09	102.25
173	295	73.67	88.79	106.84
174	51	76.25	88.75	99.46
175	70	70.83	88.57	101.56
176	91	66.25	88.50	103.25
177	204	71.11	88.44	103.08
178	138	66.25	88.12	105.68
179	66	73.00	88.00	114.33
180	177	75.08	87.75	108.19
181	151	75.80	87.74	101.62
182	17	66.25	87.50	113.75
183	67	76.96	87.50	108.75
184	62	73.93	87.50	104.64
185	188	72.11	87.50	104.29
186	122	67.92	87.31	107.50
187	104	73.93	87.31	105.00
188	66	63.75	87.22	114.17
189	203	69.58	87.03	104.69
190	121	67.08	86.94	109.22
191	205	74.79	86.88	102.73
192	141	69.20	86.73	104.11
193	50	73.75	86.67	98.50
194	95	67.19	86.50	105.89
195	944	71.5	86.5 *	104.1
196	616	70.23	86.50	102.42
197	27	71.25	86.50	98.12
198	550	69.26	86.45	103.65
199	94	69.17	86.43	98.75
200	137	72.02	86.39	98.67
201	145	73.44	86.32	97.25
202	490	70.06	86.25	102.50
203	207	70.82	86.25	102.12
204	85	72.12	86.04	98.59
205	30	62.50	86.00	94.38
206	76	75.00	85.71	99.00
207	261	68.66	85.60	104.55
208	160	65.59	85.53	101.15
209	120	71.11	85.50	103.50
210	161	63.90	85.47	102.61
211	188	71.25	85.29	101.92
212	24	65.00	85.00	103.75
213	106	70.23	85.00	102.08
214	184	68.08	85.00	100.00
215	86	63.50	85.00	99.38
216	106	61.79	85.00	98.61
217	151	72.08	84.87	104.38
218	1,359	69.30	84.72	99.42
219	148	64.55	84.58	99.69
220	87	70.75	84.42	100.18
221	110	69.82	84.33	100.62
222	155	67.16	84.22	103.47
223	203	66.25	84.22	101.77
224	93	69.02	84.17	101.75
225	73	71.04	84.17	97.64
226	143	69.52	84.04	100.11

Institution code number	*Number of students*	*Gross Scores* Q_1	*Median*	Q_3
227	102	68.25	84.00	105.42
228	112	67.00	83.75	97.78
229	265	64.73	83.70	101.51
230	257	67.27	83.69	102.77
231	167	67.16	83.65	104.58
232	192	71.19	83.40	98.44
233	42	66.88	83.33	99.17
234	163	66.25	83.28	100.25
235	334	69.55	83.28	98.75
236	139	66.38	83.27	98.47
237	175	70.95	83.13	96.56
238	151	61.72	83.12	98.12
239	99	65.94	83.12	95.42
240	96	65.00	82.86	99.23
241	28	72.50	82.50	115.00
242	28	61.67	82.50	101.00
243	116	64.44	82.50	100.56
244	379	65.42	82.43	97.97
245	132	69.09	82.33	98.75
246	100	68.33	81.88	102.14
247	161	60.16	81.75	97.98
248	395	63.41	81.74	97.45
249	72	68.57	81.67	98.33
250	449	66.34	81.64	100.89
251	102	61.79	81.56	94.69
252	79	58.75	81.50	106.56
253	1,192	65.60	81.49	98.13
254	327	65.65	81.42	98.53
255	145	65.14	81.41	96.88
256	464	65.7	81.2 *	96.1
257	100	66.50	81.11	93.75
258	113	66.77	81.04	103.75
259	48	66.25	81.00	94.00
260	139	61.46	80.89	97.79
261	303	61.69	80.88	97.80
262	57	67.81	80.83	106.25
263	97	67.25	80.83	102.29
264	126	66.07	80.77	98.61
265	23	53.75	80.63	97.08
266	507	66.60	80.65	94.66
267	61	65.21	80.62	105.75
268	37	65.62	80.62	98.44
269	27	64.38	80.62	93.12
270	63	60.94	80.50	103.25
271	77	65.21	80.50	94.79
272	117	62.60	80.31	98.75
273	133	60.21	80.19	98.44
274	14	63.75	80.00	106.25
275	62	63.12	80.00	97.50
276	48	57.50	80.00	96.67
277	112	64.50	80.00	95.56
278	524	63.00	79.90	95.54
279	495	63.85	79.85	94.12
280	138	65.75	79.62	100.25
281	353	63.97	79.46	95.99
282	551	62.28	79.38	96.25
283	200	64.00	79.09	100.00
284	370	60.6	78.8 *	98.6

Institution code number	*Number of students*	*Gross Scores* Q_1	*Median*	Q_3
285	95	59.84	78.75	94.47
286	108	63.33	78.75	91.00
287	40	64.00	78.75	90.00
288	131	54.55	78.12	101.88
289	92	58.33	78.00	97.14
290	96	62.14	78.00	91.82
291	102	66.50	77.92	95.94
292	440	62.17	77.92	93.92
293	94	62.05	77.86	94.64
294	179	54.22	77.50	100.10
295	20	60.00	77.50	95.00
296	105	63.25	77.50	91.88
297	383	62.81	77.40	95.95
298	311	62.35	76.53	95.26
299	84	60.00	76.25	91.67
300	1,633	59.81	75.65	93.00
301	657	59.1	75.6 *	93.7
302	77	63.25	75.50	97.29
303	158	60.89	75.50	91.75
304	302	58.66	75.25	94.22
305	240	59.32	75.21	89.12
306	242	59.4	75.0 *	90.5
307	126	60.97	75.00	89.25
308	145	57.75	74.75	87.25
309	140	60.45	74.71	90.71
310	79	58.96	74.69	89.25
311	132	55.00	74.50	90.00
312	115	61.25	74.32	95.14
313	481	58.39	74.32	91.52
314	95	60.47	73.61	90.78
315	176	59.50	73.61	88.46
316	93	60.78	73.06	90.54
317	123	56.09	72.95	86.81
318	105	59.58	72.50	84.79
319	94	59.32	72.14	90.50
320	123	61.17	71.94	93.04
321	107	50.0	71.9 *	93.9
322	390	57.79	71.86	89.69
323	800	57.6	71.7 *	88.6
324	38	57.50	71.67	86.50
325	143	55.34	71.59	87.03
326	37	60.31	71.25	94.38
327	163	56.96	71.03	88.25
328	66	50.36	70.83	89.50
329	127	61.99	70.75	90.78
330	95	55.34	69.69	86.61
331	122	56.14	69.29	84.64
332	100	56.00	69.17	84.00
333	230	52.36	69.00	85.23
334	86	56.75	68.12	87.50
335	98	53.50	68.12	82.19
336	98	52.19	67.78	83.61
337	129	55.62	67.71	85.42
338	32	58.33	67.50	90.00
339	390	52.13	67.42	86.18
340	110	53.41	66.43	90.42
341	185	48.17	66.17	85.38
342	121	53.44	65.94	87.64

Institution code number	*Number of students*	*Gross Scores* Q_1	*Median*	Q_3
343	36	53.33	65.00	88.75
344	62	54.06	65.00	83.93
345	127	50.63	64.77	85.94
346	68	47.50	64.17	83.75
347	98	49.7	62.9*	77.7
348	300	45.80	61.45	78.24
349	95	46.5	61.1 *	74.3
350	266	47.67	60.89	74.64
351	123	45.72	60.28	76.35
352	166	47.79	60.00	75.75
353	230	44.50	58.57	76.50
354	161	45.62	58.03	73.12
355	53	45.89	54.69	65.94

* For colleges using the separate answer sheet edition, Table XIII was used to assign medians and quartiles comparable to those for the hand-scoring edition.

Table III

Percentile Ranks Corresponding to Gross Scores in the 1938 College Editions

(Norms based on 356 colleges)

Gross Score	*8,542 Men*	*10,017 Women*	*61,821* Men and Women*	*9,263 Men and Women (Separate answer sheet)*
0	.000	.000	.000	.000
5	.000	.000	.000	.000
10	.000	.000	.000	.000
15	.001	.000	.000	.001
20	.001	.001	.001	.004
25	.001	.001	.002	.010
30	.003	.003	.005	.024
35	.007	.008	.010	.044
40	.015	.017	.020	.079
45	.029	.028	.035	.119
50	.048	.044	.058	.174
55	.076	.069	.089	.236
60	.113	.103	.128	.307
65	.158	.147	.177	.382
70	.210	.198	.233	.460
75	.271	.257	.294	.542
80	.334	.313	.359	.616
85	.403	.379	.431	.689
90	.478	.451	.505	.750
95	.555	.526	.581	.806
100	.630	.605	.656	.857
105	.701	.684	.727	.900
110	.769	.755	.790	.933
115	.823	.815	.842	.957
120	.877	.865	.887	.972
125	.914	.907	.923	.984
130	.941	.941	.948	.990
135	.961	.963	.968	.994
140	.975	.979	.981	.998
145	.986	.989	.989	.999
150	.993	.995	.995	.999
155	.996	.999	.998	1.000
160	.998	.999	.999	1.000
165	.999	1.000	.999	1.000
170	1.000	1.000	1.000	1.000
175	1.000	1.000	1.000	1.000
180	1.000	1.000	1.000	1.000
185	1.000	1.000	1.000	1.000
190	1.000	1.000	1.000	1.000
195	1.000	1.000	1.000	1.000
Q_1	73.26	74.38	71.37	55.97
Median	91.43	93.27	89.68	72.41
Q_3	108.59	109.66	106.85	90.03

* This total includes the scores of 43,262 students not classified according to sex.

Table IV

Percentile Ranks Corresponding to Q-Scores in the 1938 College Editions

(Norms based on 179 colleges)

Q-Score	*3,475 Men*	*5,055 Women*	*26,750* Men and Women*	*7,859 Men and Women (Separate answer sheet)*
2	.000	.000	.000	.000
4	.000	.002	.001	.004
6	.002	.009	.006	.015
8	.006	.029	.017	.037
10	.019	.057	.039	.069
12	.038	.098	.070	.121
14	.064	.144	.112	.179
16	.108	.201	.165	.239
18	.151	.253	.216	.307
20	.199	.311	.271	.372
22	.252	.369	.329	.447
24	.305	.433	.390	.520
26	.360	.510	.458	.600
28	.419	.591	.529	.674
30	.496	.663	.603	.747
32	.570	.737	.675	.818
34	.649	.801	.743	.868
36	.720	.858	.807	.913
38	.785	.908	.860	.942
40	.846	.944	.904	.965
42	.889	.964	.936	.980
44	.929	.976	.959	.988
46	.952	.987	.973	.994
48	.969	.992	.984	.997
50	.978	.995	.990	.999
52	.989	.998	.995	.999
54	.994	.999	.997	1.000
56	.997	.999	.998	1.000
58	.998	1.000	.999	1.000
60	1.000	1.000	1.000	1.000
62	1.000	1.000	1.000	1.000
64	1.000	1.000	1.000	1.000
66	1.000	1.000	1.000	1.000
68	1.000	1.000	1.000	1.000
70	1.000	1.000	1.000	1.000
Q_1	21.91	17.90	19.24	16.32
Median	30.10	25.73	27.18	23.45
Q_3	36.93	32.41	34.22	30.09

* This total includes the scores of 18,220 students not classified according to sex.

Table V

Percentile Ranks Corresponding to L-Scores in the 1938 College Editions

(Norms based on 179 colleges)

L-Score	*3,475 Men*	*5,056 Women*	*26,753* Men and Women*	*7,859 Men and Women (Separate answer sheet)*
−16	.000	.000	.000	.000
−12	.000	.000	.000	.000
−8	.000	.000	.000	.000
−4	.000	.000	.000	.000
0	.001	.000	.000	.000
4	.001	.000	.000	.001
8	.001	.001	.001	.004
12	.001	.001	.001	.007
16	.002	.002	.002	.014
20	.003	.004	.005	.027
24	.007	.009	.010	.054
28	.014	.015	.018	.095
32	.025	.025	.034	.157
36	.045	.045	.059	.228
40	.079	.070	.091	.306
44	.122	.103	.136	.398
48	.180	.148	.189	.487
52	.239	.203	.250	.578
56	.320	.260	.322	.661
60	.402	.332	.401	.726
64	.496	.408	.486	.791
68	.589	.489	.573	.849
72	.686	.579	.663	.891
76	.775	.668	.743	.927
80	.842	.746	.810	.955
84	.895	.815	.866	.974
88	.929	.866	.908	.987
92	.956	.908	.940	.993
96	.974	.945	.964	.996
100	.986	.970	.981	.998
104	.994	.987	.991	.999
108	.998	.997	.997	.999
112	.999	.999	.999	1.000
116	1.000	1.000	1.000	1.000
118	1.000	1.000	1.000	1.000
Q_1	52.56	55.30	52.00	37.14
Median	64.19	68.48	64.63	48.58
Q_3	74.89	80.23	76.44	61.49

* This total includes the scores of 18,222 students not classified according to sex.

Table VI

Percentile Norms for the Arithmetic Test

(Norms based on 65 colleges)

Scores	*5,206 Men*	*4,682 Women*	*10,395* Men and Women*	*2,198 Men and Women (Separate answer sheet)*
1	.001	.002	.002	.008
2	.002	.007	.004	.017
3	.005	.028	.016	.051
4	.019	.078	.049	.109
5	.045	.167	.106	.198
6	.114	.319	.215	.318
7	.232	.519	.373	.475
8	.412	.718	.561	.665
9	.591	.854	.718	.819
10	.716	.919	.815	.897
11	.817	.950	.883	.945
12	.874	.972	.923	.969
13	.915	.984	.949	.982
14	.946	.990	.967	.988
15	.963	.992	.977	.992
16	.974	.994	.984	.993
17	.980	.997	.988	.995
18	.987	.998	.992	.997
19	.993	.999	.996	.999
20	.998	.999	.998	1.000
Q_1	7.10	5.55	6.22	5.43
Median	8.49	6.90	7.68	7.13
Q_3	10.34	8.23	9.33	8.55

* This total includes the scores of 507 students not classified according to sex.

Table VII

Percentile Norms for the Analogies Test

(Norms based on 65 colleges)

Scores	*5,206 Men*	*4,714 Women*	*10,427* Men and Women*	*2,198 Men and Women (Separate answer sheet)*
1	.046	.034	.040	.075
2	.104	.077	.092	.157
3	.157	.137	.148	.237
4	.205	.181	.195	.297
5	.246	.217	.234	.341
6	.275	.241	.261	.385
7	.299	.262	.285	.427
8	.327	.290	.313	.486
9	.358	.325	.346	.538
10	.395	.364	.384	.603
11	.446	.416	.436	.661
12	.502	.476	.494	.727
13	.572	.557	.569	.788
14	.645	.640	.646	.864
15	.719	.730	.727	.909
16	.793	.811	.803	.947
17	.856	.881	.869	.967
18	.910	.933	.922	.982
19	.949	.964	.956	.992
20	.971	.983	.977	.995
21	.986	.992	.989	.998
22	.994	.998	.996	.999
23	.998	.999	.998	1.000
24	.999	1.000	.999	1.000
25	1.000	1.000	1.000	1.000
26	1.000	1.000	1.000	1.000
27	1.000	1.000	1.000	1.000
Q_1	5.15	6.43	5.59	3.22
Median	11.96	12.30	12.08	8.27
Q_3	15.42	15.24	15.31	12.38

* This total includes the scores of 507 students not classified according to sex.

Table VIII

Percentile Norms for the Number Series Test

(Norms based on 65 colleges)

Scores	*5,206 Men*	*4,710 Women*	*10,423* Men and Women*	*2,198 Men and Women (Separate answer sheet)*
1	.011	.013	.012	.030
2	.023	.032	.028	.062
3	.038	.068	.052	.111
4	.062	.117	.090	.157
5	.106	.186	.146	.235
6	.159	.263	.212	.321
7	.224	.360	.293	.413
8	.300	.464	.385	.513
9	.385	.563	.477	.611
10	.477	.657	.570	.699
11	.569	.741	.659	.772
12	.666	.812	.742	.843
13	.756	.870	.814	.894
14	.827	.923	.875	.938
15	.890	.955	.922	.963
16	.932	.976	.954	.984
17	.965	.987	.976	.992
18	.983	.995	.989	.996
19	.993	.999	.996	.999
20	.997	.999	.998	1.000
21	.999	1.000	1.000	1.000
22	1.000	1.000	1.000	1.000
23	1.000	1.000	1.000	1.000
Q_1	7.34	5.83	6.47	5.17
Median	10.25	8.36	9.25	7.87
Q_3	12.93	11.12	12.12	10.70

* This total includes the scores of 507 students not classified according to sex.

Table IX

Percentile Norms for the Completion Test

(Norms based on 65 colleges)

Scores	*5,203 Men*	*4,700 Women*	*10,410* Men and Women*	*2,198 Men and Women (Separate answer sheet)*
1	.005	.002	.003	.009
2	.013	.009	.012	.025
3	.031	.026	.030	.064
4	.065	.051	.061	.127
5	.120	.092	.111	.217
6	.193	.159	.182	.313
7	.265	.236	.259	.417
8	.352	.323	.347	.511
9	.436	.398	.428	.591
10	.521	.477	.510	.671
11	.599	.560	.590	.738
12	.667	.630	.659	.798
13	.727	.700	.723	.847
14	.785	.764	.782	.887
15	.833	.818	.831	.914
16	.871	.864	.872	.941
17	.904	.901	.906	.960
18	.932	.930	.934	.976
19	.953	.950	.954	.984
20	.968	.969	.970	.986
21	.980	.980	.981	.992
22	.986	.988	.988	.994
23	.990	.992	.992	.996
24	.993	.996	.994	.998
25	.994	.998	.996	1.000
26	.997	.999	.998	1.000
27	.999	.999	.999	1.000
28	1.000	1.000	1.000	1.000
29	1.000	1.000	1.000	1.000
30	1.000	1.000	1.000	1.000
Q_1	6.79	7.16	6.88	5.34
Median	9.75	10.28	9.88	7.88
Q_3	13.40	13.78	13.45	11.20

* This total includes the scores of 507 students not classified according to sex.

Table X

Percentile Norms for the Artificial Language Test

(Norms based on 65 colleges)

Scores	*5,206 Men*	*4,652 Women*	*10,365* Men and Women*	*2,198 Men and Women (Separate answer sheet)*
−38	.000	.000	.000	.000
−36	.000	.000	.000	.000
−34	.000	.000	.000	.000
−32	.000	.000	.000	.000
−30	.000	.000	.000	.000
−28	.000	.000	.000	.000
−26	.000	.000	.000	.000
−24	.000	.000	.000	.000
−22	.001	.000	.000	.000
−20	.001	.000	.000	.000
−18	.001	.000	.001	.000
−16	.001	.000	.001	.000
−14	.001	.000	.001	.002
−12	.002	.000	.001	.003
−10	.002	.000	.001	.004
−8	.002	.001	.001	.007
−6	.003	.001	.002	.008
−4	.005	.001	.003	.012
−2	.006	.001	.004	.020
0	.010	.003	.007	.027
2	.020	.006	.013	.052
4	.033	.010	.022	.096
6	.062	.021	.044	.188
8	.112	.040	.080	.306
10	.188	.071	.136	.438
12	.281	.123	.213	.578
14	.394	.195	.309	.700
16	.514	.290	.418	.788
18	.649	.403	.543	.862
20	.761	.527	.661	.925
22	.834	.634	.747	.956
24	.882	.706	.806	.975
26	.910	.766	.848	.984
28	.934	.815	.882	.990
30	.955	.857	.912	.994
32	.969	.890	.934	.995
34	.979	.930	.957	.997
36	.989	.960	.976	.998
38	.998	.991	.995	1.000
Q_1	11.33	15.16	12.77	7.05
Median	15.77	19.56	17.31	10.89
Q_3	19.80	25.46	22.09	15.14

* This total includes the scores of 507 students not classified according to sex.

Table XI

Percentile Norms for the Same or Opposite Test

(Norms based on 64 colleges)

Scores	*5,204 Men*	*4,677 Women*	*10,388* Men and Women*	*2,198 Men and Women (Separate answer sheet)*
2	.000	.000	.000	.002
4	.000	.000	.000	.002
6	.001	.000	.001	.004
8	.002	.001	.002	.006
10	.004	.002	.003	.011
12	.007	.004	.005	.024
14	.011	.006	.009	.046
16	.021	.010	.015	.081
18	.034	.014	.025	.125
20	.053	.022	.038	.187
22	.078	.036	.058	.256
24	.113	.053	.085	.328
26	.150	.080	.119	.404
28	.193	.114	.158	.477
30	.250	.150	.206	.544
32	.313	.193	.260	.618
34	.380	.247	.322	.692
36	.453	.320	.395	.744
38	.531	.400	.474	.796
40	.617	.490	.562	.834
42	.707	.584	.654	.869
44	.805	.682	.751	.902
46	.908	.793	.856	.937
48	.986	.901	.946	.973
50	1.000	.983	.992	.994
Q_1	30.01	34.07	31.62	21.84
Median	37.20	40.21	38.60	28.69
Q_3	42.89	45.22	43.97	36.24

* This total includes the scores of 507 students not classified according to sex.

Table XII

Comparison of Four-Year Colleges, Junior Colleges, and Teachers Colleges

(Percentile ranks based on records of 46,995 students in 230 four-year colleges, 7,097 students in 57 junior colleges, and 6,911 students in 32 teachers colleges)

Gross scores	*Four-year colleges*	*Junior colleges*	*Teachers colleges*	*Gross scores*	*Four-year colleges*	*Junior colleges*	*Teachers colleges*
0	.000	.000	.000	110	.766	.868	.871
5	.000	.000	.000	115	.823	.903	.908
10	.000	.000	.000	120	.873	.934	.937
15	.000	.000	.001	125	.912	.959	.958
20	.001	.001	.002	130	.941	.974	.974
25	.001	.003	.004	135	.963	.985	.986
30	.003	.009	.009	140	.978	.992	.992
35	.007	.020	.019	145	.987	.996	.996
40	.015	.036	.035	150	.994	.998	.998
45	.028	.061	.063	155	.997	.999	.999
50	.047	.095	.102	160	.998	1.000	1.000
55	.073	.139	.150	165	.999	1.000	1.000
60	.108	.192	.209	170	1.000	1.000	1.000
65	.151	.253	.277	175	1.000	1.000	1.000
70	.203	.323	.348	180	1.000	1.000	1.000
75	.262	.389	.422	185	1.000	1.000	1.000
80	.324	.458	.497	190	1.000	1.000	1.000
85	.395	.533	.574	195	1.000	1.000	1.000
90	.469	.608	.645				
95	.545	.685	.713	Q_1....	73.97	64.73	63.01
100	.624	.751	.776	Median	92.04	82.82	80.22
105	.699	.815	.826	Q_3....	108.83	99.89	97.92

Table XIII

Equivalent Gross Scores for the 1937 and 1938 College Editions

Percentile rank	*1937*	*1938*	*1938 (Separate answer sheet)*	*Percentile rank*	*1937*	*1938*	*1938 (Separate answer sheet)*
1	52	35	25	51	169	90	73
2	62	40	29	52	170	91	74
3	69	43	31	53	172	92	74
4	75	46	34	54	173	92	75
5	80	48	36	55	175	93	76
6	84	50	37	56	176	94	76
7	87	52	39	57	178	94	77
8	91	54	40	58	179	95	77
9	94	55	41	59	181	95	78
10	97	56	42	60	182	96	79
11	100	58	44	61	184	97	80
12	102	59	45	62	186	98	80
13	105	60	46	63	187	98	81
14	107	61	47	64	189	99	82
15	109	62	48	65	191	100	83
16	111	63	49	66	192	101	83
17	113	64	50	67	194	101	84
18	115	65	51	68	196	102	85
19	117	66	51	69	198	103	85
20	119	67	52	70	199	104	86
21	121	68	53	71	201	104	87
22	123	69	53	72	203	105	87
23	125	70	54	73	205	105	88
24	126	71	55	74	207	106	89
25	128	71	56	75	209	107	90
26	130	72	57	76	211	108	91
27	132	73	57	77	213	108	92
28	134	74	58	78	215	109	93
29	135	75	59	79	217	110	94
30	137	76	60	80	219	111	95
31	138	77	60	81	222	112	95
32	140	77	61	82	224	113	96
33	141	78	62	83	227	114	97
34	143	79	62	84	229	115	98
35	145	80	63	85	232	116	99
36	146	80	63	86	235	117	100
37	148	81	64	87	238	118	101
38	149	82	65	88	241	119	102
39	151	82	65	89	244	120	104
40	152	83	66	90	248	122	105
41	154	84	67	91	251	123	106
42	155	84	67	92	255	125	108
43	157	85	68	93	260	127	110
44	158	86	69	94	265	129	111
45	160	87	69	95	270	130	113
46	161	87	70	96	277	133	115
47	163	88	71	97	285	136	119
48	164	89	71	98	295	140	123
49	166	89	72	99	311	146	130
50	167	90	72				

Table XIV

Percentile Ranks Corresponding to Gross Scores in the 1938 High School Edition

(Norms based on 37 high schools)

Gross Score	*9th Grade* (*N*=735)	*10th Grade* (*N*=990)	*11th Grade* (*N*=223)	*12th Grade* (*N*=2583)
10	.003	.000	.000	.000
15	.007	.000	.000	.000
20	.016	.006	.004	.000
25	.034	.014	.004	.003
30	.079	.042	.004	.008
35	.161	.072	.009	.019
40	.249	.132	.040	.039
45	.314	.197	.076	.064
50	.418	.281	.108	.101
55	.503	.351	.143	.151
60	.592	.425	.188	.196
65	.678	.513	.256	.256
70	.755	.591	.300	.332
75	.814	.652	.372	.405
80	.864	.721	.466	.491
85	.903	.782	.547	.580
90	.929	.834	.691	.655
95	.950	.883	.771	.738
100	.967	.915	.830	.804
105	.976	.944	.865	.861
110	.982	.964	.910	.906
115	.988	.978	.937	.935
120	.992	.987	.960	.964
125	.999	.994	.973	.981
130	.999	.997	.987	.991
135	.999	.998	.991	.997
140	1.000	1.000	.996	.999
145	1.000	1.000	1.000	.999
150	1.000	1.000	1.000	.999
155	1.000	1.000	1.000	1.000
Q_1	40.08	48.16	64.58	64.48
Median	54.80	64.25	82.08	80.53
Q_3	69.67	82.38	93.68	95.92

Table XV

Percentile Ranks Corresponding to Q-Scores in the 1938 High School Edition

(Norms based on 34 high schools)

Q-Score	*9th Grade* (*N*=608)	*10th Grade* (*N*=783)	*11th Grade* (*N*=225)	*12th Grade* (*N*=2590)
2	.003	.003	.000	.000
4	.033	.018	.004	.006
6	.089	.049	.027	.023
8	.173	.114	.067	.064
10	.317	.202	.098	.130
12	.459	.291	.142	.193
14	.543	.372	.191	.246
16	.628	.427	.253	.302
18	.681	.481	.311	.356
20	.735	.549	.404	.424
22	.793	.623	.538	.525
24	.865	.705	.636	.641
26	.911	.774	.747	.748
28	.944	.838	.840	.835
30	.972	.886	.907	.902
32	.988	.922	.920	.943
34	.992	.958	.951	.968
36	.993	.976	.964	.980
38	.993	.989	.973	.990
40	.995	.991	.987	.997
42	.998	.995	.996	.998
44	1.000	.996	1.000	.999
46	1.000	.997	1.000	1.000
48	1.000	.997	1.000	1.000
50	1.000	.999	1.000	1.000
Q_1	9.07	11.08	15.89	14.13
Median	12.98	18.55	21.43	21.50
Q_3	20.51	25.31	26.07	26.05

Table XVI

Percentile Ranks Corresponding to L-Scores in the 1938 High School Edition

(Norms based on 34 high schools)

L-Score	*9th Grade* (*N*=608)	*10th Grade* (*N*=783)	*11th Grade* (*N*=225)	*12th Grade* (*N*=2591)
8	.005	.000	.004	.000
12	.013	.000	.009	.000
16	.023	.008	.009	.002
20	.069	.032	.009	.006
24	.146	.065	.009	.014
28	.270	.114	.022	.030
32	.345	.189	.053	.054
36	.457	.275	.084	.083
40	.551	.345	.133	.121
44	.641	.424	.173	.175
48	.740	.504	.209	.247
52	.809	.600	.271	.323
56	.849	.678	.356	.408
60	.893	.754	.467	.497
64	.931	.825	.556	.590
68	.956	.865	.676	.670
72	.977	.894	.760	.753
76	.985	.925	.836	.822
80	.993	.955	.853	.870
84	.995	.976	.902	.913
88	.995	.990	.951	.942
92	.997	.994	.973	.966
96	.998	1.000	.978	.983
100	1.000	1.000	.991	.993
104	1.000	1.000	.996	.998
108	1.000	1.000	1.000	1.000
Q_1	27.36	34.85	50.64	48.18
Median	37.82	47.78	61.50	60.11
Q_3	48.57	59.81	71.53	71.84

Table XVII

Equivalent Gross Scores for the 1937 and 1938 High School Editions

Percentile Rank	*9th Grade*		*10th Grade*		*11th Grade**		*12th Grade*	
	1937 (*N* = 959)	*1938* (*N* = 735)	*1937* (*N* = 1133)	*1938* (*N* = 990)	*1937* (*N* = 409)	*1938* (*N* = 223)	*1937* (*N* = 2279)	*1938* (*N* = 2583)
1	12	16	20	22	34	35	42	31
2	21	21	27	26	43	37	50	35
3	23	24	31	28	47	38	56	38
4	26	26	34	30	51	40	60	41
5	29	27	37	31	55	41	64	42
6	31	28	39	33	59	43	67	44
7	32	29	41	35	63	44	70	46
8	33	30	43	36	66	46	73	47
9	34	31	45	37	69	47	76	48
10	35	31	46	37	72	49	78	50
11	36	32	48	38	75	50	81	51
12	37	32	49	39	78	52	83	52
13	38	33	51	40	81	53	85	53
14	39	34	52	41	84	55	87	54
15	40	34	53	41	86	56	89	55
16	41	35	54	42	88	57	91	56
17	42	35	55	43	90	58	93	57
18	43	36	57	44	92	59	95	58
19	44	37	58	45	93	60	97	59
20	45	37	59	45	95	61	98	60
21	46	38	60	46	96	62	100	61
22	47	38	61	46	97	62	101	62
23	48	39	63	47	99	63	102	63
24	49	40	64	48	100	64	103	64
25	50	40	65	48	101	65	105	64
26	51	41	66	49	102	66	106	65
27	52	42	67	49	103	67	107	66
28	53	42	69	50	104	68	109	67
29	54	43	70	51	105	69	110	67
30	55	44	71	51	106	70	111	68
31	56	45	72	52	107	71	112	69
32	57	45	73	53	108	71	113	69
33	58	46	75	53	109	72	114	70
34	60	46	76	54	110	73	115	71
35	61	47	77	55	111	73	116	71
36	62	47	78	56	111	74	117	72
37	63	48	79	56	112	75	118	73
38	64	48	80	57	113	75	119	73
39	65	49	81	58	114	76	121	74
40	66	49	83	58	115	76	122	75
41	67	50	84	59	116	77	123	75
42	68	50	85	60	116	78	124	76
43	69	51	86	60	117	78	125	76
44	70	51	87	61	118	79	126	77
45	71	52	88	61	119	79	126	78
46	72	53	89	62	120	80	127	78
47	73	53	91	63	120	80	128	79
48	74	54	92	63	122	81	129	79
49	75	54	93	64	123	82	130	80
50	76	55	94	64	124	82	131	81
51	77	55	95	65	125	83	132	81

Percentile Rank	*9th Grade*		*10th Grade*		*11th Grade**		*12th Grade*	
	1937 ($N=959$)	*1938* ($N=735$)	*1937* ($N=1133$)	*1938* ($N=990$)	*1937* ($N=409$)	*1938* ($N=223$)	*1937* ($N=2279$)	*1938* ($N=2583$)
52	78	56	96	65	127	83	133	82
53	79	57	97	66	128	84	134	82
54	80	57	99	67	129	85	135	83
55	81	58	100	67	130	85	136	83
56	82	58	101	68	131	86	137	84
57	83	59	102	69	132	86	137	84
58	84	59	103	69	132	86	138	85
59	85	60	104	70	133	87	139	86
60	87	60	105	71	134	87	140	86
61	88	61	105	72	135	87	141	87
62	89	62	106	72	135	88	142	88
63	90	62	107	73	136	88	143	88
64	91	63	108	74	137	88	144	89
65	92	63	109	75	138	89	145	90
66	93	64	110	76	139	89	146	90
67	94	65	111	76	139	89	147	91
68	95	65	113	77	140	90	148	92
69	96	66	114	78	141	90	149	92
70	97	66	115	78	142	91	150	93
71	98	67	116	79	143	91	151	93
72	99	68	117	80	144	92	152	94
73	100	68	118	81	145	92	153	95
74	102	69	119	81	146	93	154	95
75	103	70	120	82	147	94	155	96
76	105	70	122	83	148	94	156	97
77	106	71	123	84	149	95	157	98
78	108	72	124	85	150	96	158	98
79	109	73	126	86	151	97	159	99
80	111	74	127	87	153	97	161	100
81	112	75	129	88	154	98	162	101
82	114	76	130	89	156	99	163	102
83	115	77	131	90	158	100	164	102
84	117	78	133	91	159	101	165	103
85	118	79	135	92	160	103	167	104
86	120	80	137	93	162	104	168	105
87	122	81	139	94	163	105	169	106
88	124	82	141	95	164	107	171	107
89	126	83	143	96	166	108	172	108
90	128	84	145	98	167	109	174	109
91	130	86	147	99	169	110	176	111
92	133	88	150	101	170	112	178	113
93	135	90	152	103	172	114	180	114
94	138	93	155	104	175	116	182	116
95	141	95	159	107	177	118	185	118
96	145	98	162	109	180	120	188	120
97	149	102	166	113	184	124	192	121
98	154	107	172	117	188	128	196	124
99	162	117	181	123	194	135	202	129

* The norms for Grade 11, based on smaller populations, obviously are not so dependable as those for the other three grades.

Correlations with Scholarship

A number of studies have been made of the relation between the psychological examination and scholarship, and the correlations are usually in the neighborhood of .50. In Table

XVIII we have summarized data on the validity of the examination for scholarship in the College at the University of Chicago for several years. These data were obtained from the annual reports of the Board of Examinations at the University of Chicago. Since all students in the College are required to take the four general courses in the freshman and sophomore curriculum, and since the grades in these courses are determined entirely by the student performance on four six-hour examinations, these validity correlations are of some interest. In the table we have included also the intercorrelations of the four general course examinations. As a measure of general scholarship for these groups we have taken the average of the four general course examinations. It will be seen that the correlations of the Psychological Examination and average scholarship for freshmen and sophomores are ap-

Table XVIII

Correlations of the Psychological Examination With Scholarship

	Biological Sciences Introductory Course	*Humanities Introductory Course*	*Physical Sciences Introductory Course*	*Social Sciences Introductory Course*	*Average Score Introductory Courses*	*Academic Year*
	.43	.49	.46	.46	.52	1933–34
Psychological	.46	.46	.39	.48	.50	1934–35
Examination	.47	.47	.46	.50	—	1935–36
	.47	.53	.40	.51	.53	1936–37
		.75	.80	.73	—	1933–34
Biological Sciences		.82	.72	.84	—	1934–35
Introductory Course		—	—	—	—	1935–36
		.75	.81	.82	—	1936–37
			.60	.75	—	1933–34
Humanities			.66	.82	—	1934–35
Introductory Course			—	—	—	1935–36
			.73	.72	—	1936–37
				.80	—	1933–34
Physical Sciences				.67	—	1934–35
Introductory Course				—	—	1935–36
				.66	—	1936–37

proximately .50. The correlations for 1933-34 are based on from 200 to 2,000 cases. For the other academic years, the correlations are based on from 400 to 600 cases.

In preparing a psychological examination for estimating scholastic ability, it must be recalled that scholarship varies widely, not only in level among the different colleges, but also in the particular abilities required. In general, a scholastic aptitude test should be rather heavily saturated with language factors, since these are represented in scholarship. It is doubtful whether a refinement as to particular abilities can be obtained reliably within the total time of a one-hour examination. With these practical limitations in mind, we have suggested the division into only two parts, namely, one part that is primarily linguistic and one part that is more quantitative in character. It should not be inferred that these parts are any more fundamental in nature than the customary division of psychological tests into rough classifications by calling some of them verbal and others nonverbal. Most school curricula can be classified for practical purposes as linguistic or scientific. There should be some correspondence between the two test scores and the preferred type of curriculum; but, as every experienced counselor knows, the problem is too complex to justify the interpretation of a test result as more than a general indication of the scholastic abilities of the student.

Intercorrelations of the Subtests

The intercorrelations of the six parts of the Psychological Examination and the summation scores, Quantitative, Linguistic, and Gross, are shown in Table XIX for a group of 300 students. The group selected constitutes a representative sampling of the total population. It will be seen that the Q- and L-scores have a correlation of .55. Since all psychological tests are positively correlated, we expect a positive correlation between two composites. Lower correlations can be obtained if the tests in each composite are made more restricted in range of abilities, but in that case we are not likely to cover so well the usual range of scholarship criteria. If

Table XIX

INTERCORRELATIONS OF PART-SCORES
1938 COLLEGE EDITION

		1	2	3	4	5	6	7	8	9
Arithmetic	1	—	.396	.493	.344	.312	.313	.697	.378	.551
Analogies	2	.396	—	.412	.384	.420	.462	.861	.507	.709
Number Series	3	.493	.412	—	.297	.369	.302	.771	.383	.582
Completion	4	.344	.384	.297	—	.535	.645	.437	.815	.764
Artificial Language	5	.312	.420	.369	.535	—	.527	.478	.820	.784
Same–Opposite	6	.313	.462	.302	.645	.527	—	.477	.885	.831
Q-Score	7	.697	.861	.771	.437	.478	.477	—	.552	.798
L-Score	8	.378	.507	.383	.815	.820	.885	.552	—	.943
Gross Score	9	.551	.709	.582	.764	.784	.831	.798	.943	—

Table XX

CENTROID MATRIX

	I	*II*	h^2
1	.591	−.350	.472
2	.634	−.097	.411
3	.598	−.370	.495
4	.720	.352	.642
5	.674	.156	.479
6	.731	.312	.632

SECOND FACTOR RESIDUALS

	1	2	3	4	5	6
1	+.002	−.013	+.011	−.041	+.031	+.010
2	−.013	+.016	−.003	+.038	−.008	−.029
3	+.011	−.003	−.008	+.004	−.024	+.020
4	−.041	+.038	+.004	−.005	−.005	+.009
5	+.031	−.008	−.024	−.005	+.020	−.015
6	+.010	−.029	+.020	+.009	−.015	+.006

tests are constructed for special curricula, as in vocational schools, they can be made more restricted in range of abilities to correspond to a restricted scholarship criterion.

The Q- and L-scores have correlations with the total score of .80 and .94, respectively, as shown in Table XIX. The linguistic tests were given heavier weight for the total score in the Psychological Examination in order to match the usual scholarship criteria of the colleges. College scholarship is ordinarily much more saturated with verbal factors than with factors involved in quantitative thinking. This relatively heavier weighting of the linguistic tests in the total score is shown in the higher correlation of the L-score with the gross score in the test.

To group psychological tests in accordance with their raw intercorrelations is a rather common practice. This is defensible for rough inspectional purposes only. Such a procedure is not a safe guide, because it can happen that two tests

in different constellations have a higher correlation than two tests within the same constellation. Table XIX has no conspicuous exception of this kind, but the correlation between tests 2 and 6 is a little higher than two of the correlations within the Q-constellation—1, 2, 3. In order to determine more definitely the constellations in this examination, the six subtests were analyzed factorially. Since there are only six

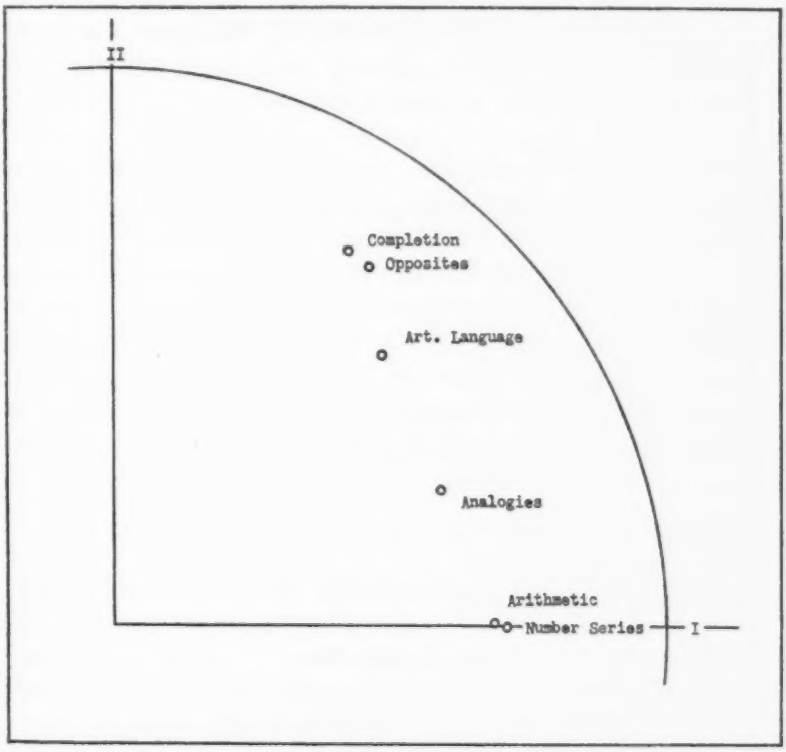

Figure 1

independent tests in this examination, the maximum number of factors that can be determined is three. Table XX shows the centroid matrix for two dimensions and also the second factor residuals. The residuals practically vanish, so that the examination can be described in terms of two common factors. Since two common factors are sufficient to account for the in-

tercorrelations of the six subtests, the relations between them can be shown on a single diagram, as in Figure 1. The grouping of the tests is now apparent. The three linguistic tests form one constellation, namely, Completion, Same-Opposite, and Artificial Language. The other three tests form a second constellation, namely, Analogies, Arithmetic, and Number Series. The two constellations are correlated, *i.e.*, they are represented by an angular separation of about sixty degrees. It should be clearly understood that these two constellations do not represent primary factors. Both of these composites are complex as to their primary factorial composition.

Those who are interested to examine a more detailed study of the parts of the Psychological Examination should consult *Bulletin No. 26* of the Educational Records Bureau of New York. Miss Margaret Seder's report, pages 51-58, summarizes a study of the composite scores on the primary factors and the six subtests of the Psychological Examination which were all given to the same experimental group. In that study, the estimated reliability of the total score was .95, and the reliabilities of the Q- and L-scores, .87 and .95, respectively.

Experimental Tests for Primary Mental Abilities

Because of a rather general interest in the problem of appraising each individual in terms of a profile of abilities instead of a single index of mental endowment, we have prepared an experimental edition of the tests for primary mental abilities. This test battery is not yet to be regarded as a service test for testing routine in the schools and colleges. It has been constructed on the basis of three factor studies. The tests have been adapted for machine scoring.

The experimental test battery consists of sixteen subtests with two or three tests assigned to each of six primary factors. The whole battery has been designed to be given in three sessions of about an hour and a half each. In order to make the tests feasible from the standpoint of computational labor,

several compromises have been made. The complete factorial procedure would be to determine the standard score in each primary factor for each subject as a linear combination of the sixteen separate tests. Such a procedure would be prohibitive in computational work in most situations. As a practical compromise we have selected two or three tests for each of six primary factors which is then represented by a small group of tests. The scores of the several tests in each of the six groups are combined into what we have called a *composite score* for each primary factor. In this way, each primary factor is regarded as if it were a criterion in the ordinary sense, and the several tests are combined into a single, best available measure for that criterion.

It should be clearly understood that these six composite scores, one for each primary factor, are correlated. The correlations of the primary factors in the general population are low and positive, and their true values may be zero. The composites are correlated because it is not yet possible to prepare tests that are relatively pure measures of the primary factors. Uncorrelated estimates of the primary factor scores can be made by taking linear combinations of all of the tests, but this procedure is not likely to be practical because of the computational work. Eventually, when the tests have been revised to some degree of stability, it would be possible to prepare facilitating tables for the computations of estimated primary scores; but such a procedure does not seem to be worth while as long as the tests are in constant state of revision and improvement as regards their factorial composition for specified age groups. Each of the six composite scores should be regarded just as an ordinary test score whose validity is the correlation of the composite with the primary factor which it represents. The composites are correlated test scores, while the primary factors are uncorrelated, or nearly so.

Several studies are now being made with these tests for primary factors in order to determine whether significant differences are found in the profiles for students in different professional schools and in different academic subjects. Rela-

tions are also being determined between the composite scores and the vocational interests of students. These studies will be reported probably during the coming year.

The present experimental battery of tests for the primary factors should be used preferably only in schools where competent psychological and statistical advice is available for the interpretation of the test results.

The 1939 Edition

The next edition of the Psychological Examination is now in preparation. One of the principal revisions is in the Same-Opposite Test, which was clearly too easy in the current edition. This test will be revised to make it comparable with the difficulty of the Same-Opposite Tests in previous editions. The relative weight of this test will probably be retained. Some reviewers have made the erroneous judgment that the relative weight of a subtest in the validity of the whole examination is determined by the total number of points assigned to the subtest. The weight of a subtest in the differentiating value of the whole examination is proportional to its standard deviation. It seems proper for the Same-Opposite Test to have a weight somewhat greater than other tests because of the well-known validity of opposites and vocabulary which are involved in this test.

Arrangements have been made to prestandardize the next edition of the Psychological Examination so that preliminary norms will be available as soon as the test is released in August.

The Council at Work

THE Council at Work is a brief summary of the outstanding new projects in which the Council is interested, as well as a progress report on undertakings already launched. It is hoped that this survey will give to the members of the Council and those interested in its work a more intimate view of the Council's development. Individuals desiring further information regarding subjects mentioned in this section are invited to write to the offices of the American Council on Education, 744 Jackson Place, Washington, D. C.

Twenty-second Annual Meeting of the Council

On May 5 and 6, 1939, the twenty-second annual meeting of the American Council on Education will bring together in Washington, D. C., representatives of member institutions and organizations of the Council, as well as many interested guests. "General Education in the United States" has been chosen as the central theme for the several sessions which will be held again this year at the Mayflower Hotel.

President Zook will open the meeting on Friday morning, May 5, with his annual presidential report. Vivian T. Thayer, educational director of the Ethical Culture Schools and chairman of the Progressive Education Association's Commission on Secondary School Curriculum, will summarize the development of numerous trends in general education. On Friday afternoon four projects of the Council and another associated with it will sponsor conference sections for reports and discussions of their activities. These, with their presiding officers, are: American Youth Commission, Homer P. Rainey;

Financial Advisory Service, J. Harvey Cain; Educational Motion Picture Project, Charles F. Hoban, Jr.; Commission on Teacher Education, Karl W. Bigelow; and Cooperative Study of Secondary School Standards, Walter C. Eells.

At the formal dinner on Friday evening Herbert E. Hawkes, dean of Columbia College and chairman of the Council for 1938-39, will deliver the chairman's address. The second speaker will be Sir Willmott Lewis, Washington correspondent of the *London Times* and radio commentator on international affairs.

The morning of the second day will open with a panel discussion of general education with Mark A. May, director of the Institute of Human Relations of Yale University, presiding. The following members of the panel have already accepted: Charles H. Judd, National Youth Administration; B. Lamar Johnson, Stephens College; Grayson N. Kefauver, Stanford University; and Henry M. Wriston, Brown University. There will also be representation from secondary education.

On Saturday noon all members and their friends will be guests of the Council at the traditional buffet luncheon at the Cosmos Club. The closing session of the twenty-second annual meeting on Saturday afternoon will include a noted speaker on international affairs. Daniel A. Prescott of the Commission on Teacher Education and author of *Emotion and the Educative Process* will speak on the implications of general education for the individual student. Full details will be published in the program which will be mailed early in April.

Membership

On February 11 the Committee on Problems and Plans in Education met in Chicago. The following day there was a joint meeting of this committee and the Executive Committee for a discussion of the future program of the American Council. The Executive Committee also held its regular winter session on the evening of the 12th and on the 13th. The fol-

lowing applications for membership were approved by the Executive Committee:

Constituent:

Association of American Universities
Boy Scouts of America

Associate:

American Council of Guidance and Personnel Associations
American Home Economics Association
American Student Health Association
National Council on Schoolhouse Construction
National Institute of Public Affairs

Institutional:

Academy of Mt. St. Vincent, Mt. St. Vincent-on-Hudson, New York
Ashland College, Ashland, Ohio
Atlanta University, Atlanta, Georgia
Bradley Polytechnic Institute, Peoria, Illinois
Bucknell University Junior College, Wilkes-Barre, Pennsylvania
College of St. Francis, Joliet, Illinois
Denver Public Schools, Denver, Colorado
Edinburg Junior College, Edinburg, Texas
Hampton Institute, Hampton, Virginia
Hobart College, Geneva, New York
Kemper Military School, Boonville, Missouri
Lasell Junior College, Auburndale, Massachusetts
Lincoln Memorial University, Harrogate, Tennessee
MacMurray College, Jacksonville, Illinois
Norwich University, Northfield, Vermont
Notre Dame College, South Euclid, Ohio
Providence College, Providence, Rhode Island
State Teachers College, Trenton, New Jersey
University of Oklahoma, Norman, Oklahoma
University of Tulsa, Tulsa, Oklahoma
Western Carolina Teachers College, Cullowhee, North Carolina

With these additions the membership of the Council on February 13 was: constituent, 32; associate, 35; institutional, 383; total, 450.

Rural Social Studies

In March the Council received an appropriation of $5,000 from the General Education Board for an exploratory study of the supply of trained personnel in the field of rural social studies, with particular reference to the South. This project meets requests to the Council by the Social Science Research Council and other organizations for an investigation in this field. On February 1 and 2 Dr. Marsh called together the following individuals for informal consultation on the development of the project:

M. P. Catherwood, Cornell University
Wilson Gee, University of Virginia
C. T. Loomis, U. S. Department of Agriculture
E. G. Nourse, Brookings Institution
T. W. Schultz, Iowa State College
T. Lynn Smith, Louisiana State University
Carl F. Taeusch, U. S. Department of Agriculture
Carl C. Taylor, U. S. Department of Agriculture
T. J. Woofter, Works Progress Administration
Leon Wolcott, Committee on Public Administration, Social Science Research Council

These men agreed that there was increasing demand for trained personnel in the rural social studies, due largely to the growth of federal and state agricultural programs; that, at the same time, much of the trained personnel and promising student material, has already been drawn into these programs; and that immediate attention should be given to a study of available teaching staffs, available students, graduate study, library facilities, etc.

Accrediting Association Conference

President Zook has invited the major national organizations concerned with accrediting institutions of higher education to send representatives to a meeting in Washington, D. C., on April 7 and 8, 1939. The purpose of the conference will be to discuss the various problems in the present accrediting

situation. The conference will, of course, be advisory in nature. Invitations were extended to the following groups:

American Association of Collegiate Schools of Business
American Association of Schools and Departments of Journalism
American Association of Schools of Social Work
American Association of Teachers Colleges
American Association of Theological Schools
American Association of University Women
American Bar Association
American Chemical Society
American Council on Pharmaceutical Education
American Library Association
American Medical Association, Council on Medical Education and Hospitals
American Veterinary Medical Association
Association of American Universities
Association of Collegiate Schools of Architecture
Association of Collegiate Schools of Nursing
Committee on Accrediting in Home Economics of Land Grant College Association
Council on Dental Education
Engineers Council for Professional Development
Joint Committee of Association of Land Grant Colleges, and National Association of State Universities
Middle States Association of Colleges and Secondary Schools
National Association of Schools of Music
North Central Association of Colleges and Secondary Schools
Office of Education, U. S. Department of Interior
Society of American Foresters
Southern Association of Colleges and Secondary Schools

Commission on Teacher Education

On February 25 the Commission on Teacher Education sponsored in Cleveland the second annual joint conference of associations active in the preparation of teachers. Grayson N. Kefauver, Stanford University, and Karl W. Bigelow, director of the Commission, were the speakers, with Payson Smith, Harvard University and chairman of the Commission,

presiding. At the meeting a new publication was distributed, *Cooperation in the Improvement of Teacher Education: A Statement Regarding the Plans of the Commission on Teacher Education.* The statement outlines the background of the Commission, the premises which the Commission has accepted as basic to its planning, and the program of activities for the immediate future. Complimentary copies may be obtained by writing to the Washington offices of the Council.

Publications

The Council has an unusually heavy publication schedule for the next several months. It is anticipated that the following items will be completed before the annual meeting:

Books:

Labor Camps for European Youth by Kenneth Holland. A report to the American Youth Commission

The Health of College Students by Harold S. Diehl and Charles E. Shepard. A report to the American Youth Commission

Equal Educational Opportunity for Youth: A National Responsibility by Newton Edwards. A report to the American Youth Commission

Studies:

Business Education at the College Level. A report by a subcommittee to the Council's Committee on Business Education

School Buildings and Equipment. A report by the School Plant Research Council.

Educational Counseling of College Students by Helen Bragdon, A. J. Brumbaugh, Basil H. Pillard, and E. G. Williamson for the Committee on Student Personnel Work

Occupational Orientation of College Students by W. H. Cowley, Robert Hoppock, and E. G. Williamson for the Committee on Student Personnel Work

Funds Subject to Annuity Agreements. A report of the Financial Advisory Service

In March the Council published the *Seventh Yearbook of School Law,* edited by M. M. Chambers. The 1939 edition

in this series, which has now been widely accepted as the authoritative reference regarding legal decisions which affect education, contains 18 chapters and 196 pages prepared by leading authorities. The *Seventh Yearbook* particularly stresses intergovernmental cooperation in many forms for the provision of public school facilities. It also reports two United States Supreme Court decisions with regard to higher education. The publication is made possible by a grant from the Carnegie Corporation of New York. Copies of the current and preceding editions are available at $1.00 each.

American Youth Commission

Clarence A. Dykstra and Robert E. Wood have accepted membership on the American Youth Commission to replace the late Newton D. Baker and Lotus D. Coffman. Dr. Dykstra, president of the University of Wisconsin and former city manager of Cincinnati, is well known for his deep interest in civic matters. General Wood, chairman of the board of Sears, Roebuck and Company, brings to the Commission a broad experience in military, business, and social activities.

E. L. Kirkpatrick, an associate director of the Commission in charge of rural studies, and members of his staff have prepared six mimeographed documents which are being distributed by the Commission. The most recent, *Rural Youth Speaks,* written by Joseph J. Lister and Dr. Kirkpatrick, is a further refinement of data gathered in the Maryland survey. Copies are for sale at 30 cents each.

Staff

J. Harold Goldthorpe joined the staff of the Council on February 1 for five months as a research associate. Dr. Goldthorpe is working particularly with the School Plant Research Council and the Committee on Government and Educational Finance.

Earl J. McGrath, formerly research associate on the Council staff, has been named Specialist in Higher Education.

Conferences and Meetings

The Council has been represented by its administrative officers at the following meetings since January 1939:

American Association of Junior Colleges, Grand Rapids, Michigan
American Association of School Administrators and allied organizations, Cleveland, Ohio
American Council of Guidance and Personnel Association, Cleveland, Ohio
American Council of Learned Societies, Washington, D. C.
American Engineering Council, Washington, D. C.
National Committee on Coordination in Secondary Education
Works Progress Administration Appraisal Committee, Washington, D. C.